THE MOORE & WHITE
Improved ROTARY SCREEN

Points of Superiority

Greater Capacity

Cleaner Stock

Lower Maintenance Cost

Fool-Proof

Compact

Reasonably Priced

Complete Information and Prices Upon Request

THE MOORE & WHITE COMPANY

ESTABLISHED 1886

North Philadelphia Station, Penna. R. R., Philadelphia, U. S. A.

Vol. 5—No. 12

THE PAPER INDUSTRY

A. SCOTT DOWD
Editor

A MONTHLY EDUCATIONAL JOURNAL
Devoted to the Interests of the Pulp and Paper Industry

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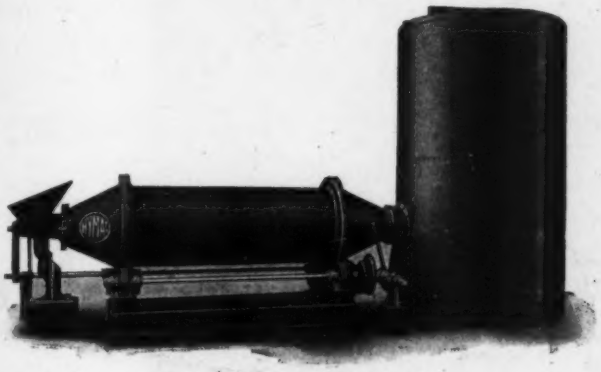


SULPHUR BURNERS

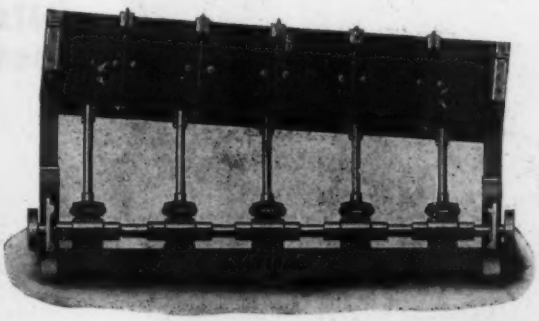
THE efficiency of the ROTARY SULPHUR BURNER is so well known as to need no comment here. We have built it in Canada for many years in sizes 36″ x 8′ 0″ to 48″ x 20′ 0″. Self Feeds for dry sulphur. Melting Tanks with piping systems and steam Plug cocks, Combustion Chambers and direct connected Electric Drives are also part of our product.

ACID RESISTING BRONZE

WE have a most complete EQUIPMENT OF PATTERNS covering all types of Valves, Fittings, Pipe and Specials.

We have provided some of the largest Sulphite producers in Canada with complete equipment.

Analysis to customer's specifications.

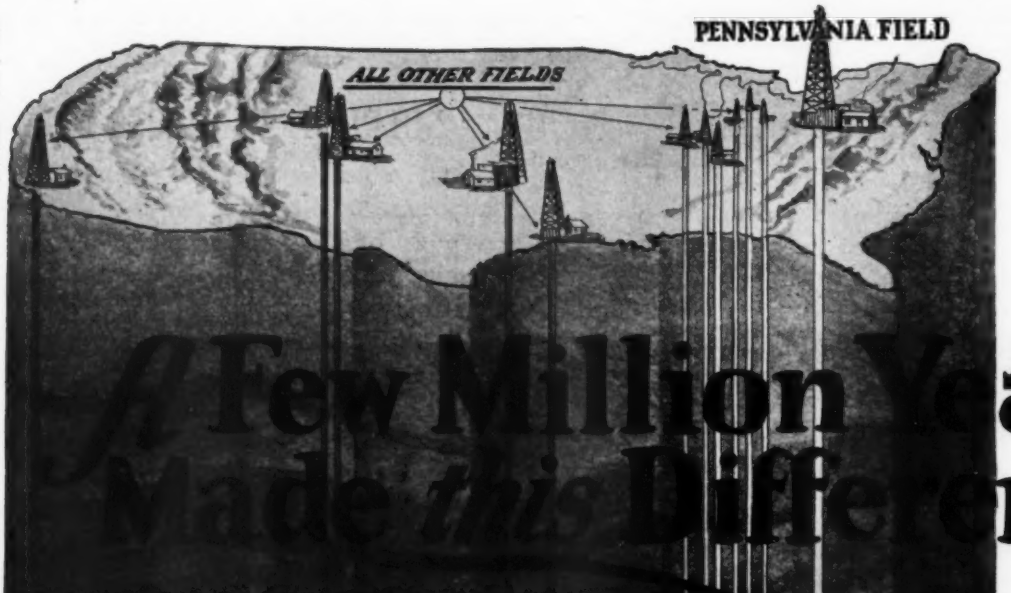


FLAT SCREENS

ONE Canadian Sulphite Mill uses 138 of our HYMAC INCLINED SCREENS (Patented). Many others are users in less degree of Flat or Inclined. We use a special Cam that is of chilled cast iron, ground to size. Its shape imparts a quick upward blast which frees the plate of foreign matter and a slow downward motion which ensures the maximum production. There are many other features that warrant investigation.

THE HYDRAULIC MACHINERY CO., LIMITED.

MONTREAL, QUE.



A Few Million Years Made this Difference

Mother nature showed a decided preference when she made the crude oil deposits in the Pennsylvania Region. A few million years, as reckoned by geologists and astronomers, is not a long time; but this short period accounts for the fact that Crude Petroleums from the Pennsylvania Region are of Paraffin Base, and the rest of the continent must satisfy its local pride with the inferior grade Asphaltum Base Petroleums.

Oils refined from Pennsylvania Crude do not need to be treated with acid in the process of refining and possess that indefinable quality that makes one oil outlive another of identical analysis and color as much as three times thus nature has taken millions of years to accomplish what refiners try to do in a few minutes.

WAVERLY LUBRICATION is refined from Pennsylvania Paraffin Base Crude and only from selected wells in the Pennsylvania field. It is rated highest in all tests and we can show you facts and figures proving that *WAVERLY LUBRICATION* has reduced lubrication cost materially wherever used. We would be glad to submit these facts to any industrial company and can absolutely prove our point.

The Waverly Oil and Grease Charts show correct lubrication for over 500 standard make machines.

Send for Them

Waverly Oil Works Co.

5407-54th STREET PITTSBURGH, PA.

Established 44 years

Waverly ALL PENNSYLVANIA Oils Greases

PARAFFINE BASE PETROLEUM

ASPHALTUM BASE PETROLEUM

100% PURE PENNSYLVANIA OIL

Y

BOWSER ESTABLISHED 1885

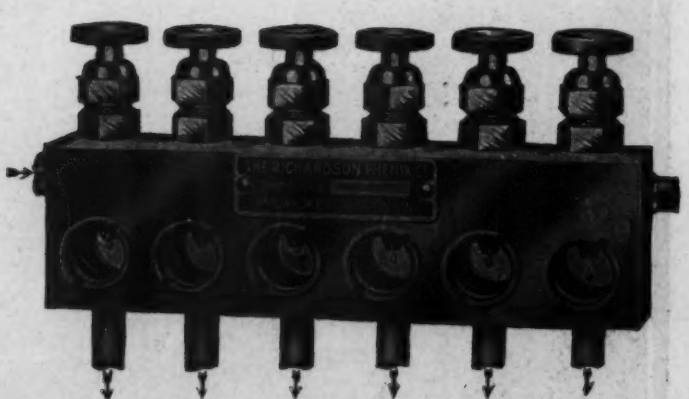
LUBRICATORS–OIL FILTERS–OILING SYSTEMS–ACCESSORIES
OIL STORAGE AND DISTRIBUTION SYSTEMS

Oiling System Accessories

Phenix Sight Flow Indicator

R. P. No. 12—Sight Feed Oiler
Four-Window

R. P. Clear Vision Feed
Oiler

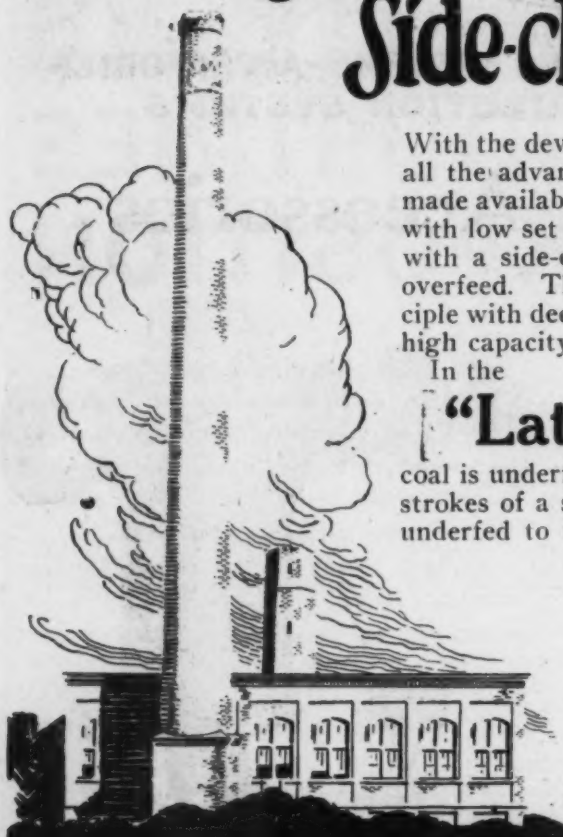


No. 20 R. P.—Multiple Sight Feed Oiler

S. F. BOWSER & CO., INC.

LUBRICATION ENGINEERS AND MANUFACTURERS
FORT WAYNE INDIANA

The Only True All Underfeed, Side-cleaning Stoker!



With the development of an all-underfeed side-cleaning stoker all the advantages of a multiple retort underfeed stoker are made available for smaller sized boilers and for existing plants with low set boilers. No longer is it necessary to be satisfied with a side-cleaning stoker that is part underfeed and part overfeed. The successful adaptation of the all-underfeed principle with deep retorts and simple but complete control insures high capacity and maximum efficiency.

In the

"Lateral Retort" Stoker

coal is underfed to the central retort by successive, controlled strokes of a steam driven ram and pusher blocks. It is then underfed to the several lateral retorts by an auxiliary, separately controlled steam cylinder.

Note that at all times the coal is underfed; at no time is it overfed onto side grates as in other side-cleaning stokers.

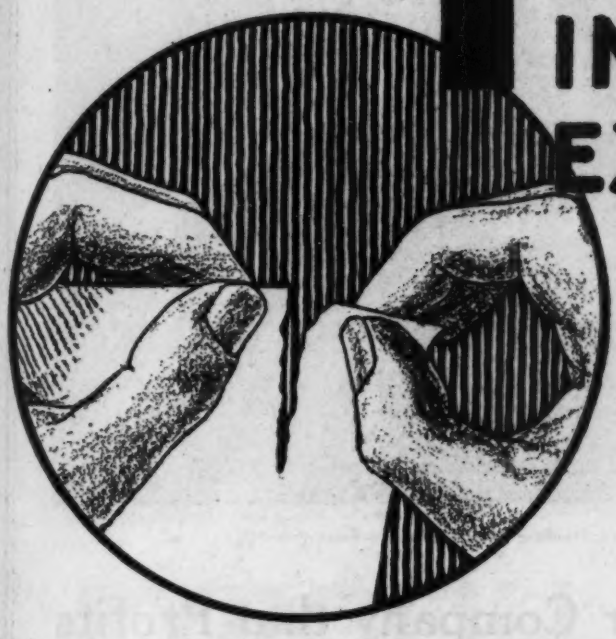
A full description of this great advance in stoker design is given in Bulletin N7. Ask for it.

SANFORD RILEY STOKER CO.
WORCESTER, MASS.

Here are shown three "Lateral" Retort" stokers installed under 360 H. P. B. & W. boilers. They replaced hand-fired furnaces. This change has made possible a saving of several tons of coal per day while two less firemen are required.

TRADE MARK

The Second Annual PAPER INDUSTRIES EXPOSITION



IF YOU knew ALL about paper making—your income tax would probably "choke an elephant." But no one man can ever know it all. However, the Paper Exposition projects all the knowledge that has been gained by thousands as on a screen so you may gather quickly the things which will benefit you particularly.

Remember the TIME and the PLACE.

Grand Central Palace
New York City
Week of April 7th

EXHIBIT spaces are being taken rapidly. Has your sales department selected yours yet? If not, write **now** for diagram and costs of spaces.

The Paper Exposition will be on the MAIN FLOOR of the Grand Central Palace this year.

One trade paper wrote about last year's Exposition: "The various booths devoted to machinery and apparatus, mill supplies and equipment had a full quota of interested visitors all eager to see or be told about the latest thing in the mechanics of screening, slicing and pumping; the filtration of water, sedimentation and recovery of waste, or perhaps the best method of making rosin size. For the engineer, superintendents or the technical man in a pulp or paper mill some of the exhibitors gave continuous demonstrations of the operations of various modern inventions."

No matter how much you know about paper—or how successful you are—you can get useful and helpful information from the various exhibits and lectures. It will pay you to have all your department heads, as well as yourself, spend one or several days at this Exposition.

PAPER INDUSTRIES EXPOSITION, Grand Central Palace, New York City

Typical Installation of Triple Effect Evaporator Handling Black Liquor in a Large Pulp Mill

Here's Another Paper Company that Profits by a Swenson Installation. *Why Not You?*

If you use the soda or sulphate process, Swenson reclaiming machinery will meet every requirement. Our more than 30 years' experience enables us to render you a real service in solving special problems. Whiting Corporation's complete manufacturing facilities are back of Swenson products.

Submit your evaporator problems to Swenson. Bulletin P-123 on request.

SWENSON EVAPORATOR CO.
(Subsidiary of Whiting Corporation)
Main Office and Works: HARVEY, ILL. (Chicago Suburb)

Our Experiment Station at Ann Arbor is equipped to make tests, on a commercial scale (under the direction of Prof. W. L. Badger) on problems involving evaporation, crystallization, heat transfer, etc., at a moderate charge.

SWENSON
EVAPORATORS – *any capacity for any liquor*
Pulp Mill Machinery – Continuous Crystallizers
Beet Sugar Equipment – Chemical Machinery

Stops *roof sweating* in machine rooms

PYROFILL
MONOLITHIC ROOFS

U S

Bogalusa Paper Company, Bogalusa, La.
Architect: James L. Carey.
23,000 sq. ft. Pyrofill Deck used

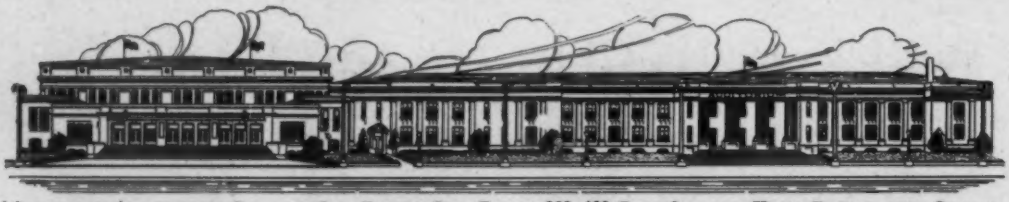
Paper mills the country over are finding Pyrofill gypsum roofs the surest and most economical protection against roof sweating and its attendant evils.

The same superior heat-insulating quality of this poured-in-place dense gypsum deck which checks condensation also prevents excessive heat losses, reduces the number of air changes needed, cuts down fuel bills.

Pyrofill decks are easily and safely erected in winter weather. Their light weight means sharp savings in supporting steel. They are fireproof and permanent; upkeep is negligible.

There is a type of Pyrofill (poured-in-place) or Pyrobar (precast) to suit every roof design. If desired we contract to erect them. Write for estimates or other information.

UNITED STATES GYPSUM COMPANY
World's Largest Producers of Gypsum Products
General Offices: Dept. D, 205 W. Monroe St., Chicago, Ill.



MILWAUKEE AUDITORIUM, COVERING ONE ENTIRE CITY BLOCK, 320x420 FEET, SCENE OF THIRD EDUCATIONAL GRAPHIC ARTS EXPOSITION AND FIFTH ANNUAL CONVENTION OF ASSOCIATION OF PRINTING HOUSE CRAFTSMEN

To the Paper Maker and Paper Trade, and to the Manufacturer of Equipment Serving These Industries:

The Craftsmen Hand You This Great Opportunity

GENERAL MANAGERS, Superintendents, Foremen, and executives generally of the Paper, Printing, Lithographic and Allied Trades—the ones who buy equipment or are consulted on all purchases, and who are personally responsible for operating results—will be at the

Milwaukee Educational

Graphic Arts Exposition

August 18 to 23, 1924

¶ The Advertiser and the Buyer of Printing will also be there in unusual numbers.

¶ 150,000 visitors who are directly interested will be there to meet you and talk with you about your products.

¶ Surely you cannot afford to miss this unparalleled opportunity to get the undivided attention of this vast buying power.

¶ How much more effective future calls of your salesman will be with the closer acquaintanceship, more intimate knowledge of your products and practical demonstration as a background!

No greater economy in selling your goods has ever been available. More prospects will be present at this exposition every day than your entire sales force could visit in a year.

Address all communications to

Milwaukee Graphic Arts Exposition, Inc.

Hotel Pfister, Milwaukee, Wisconsin

Opportunity Coupon—Fill in and Mail Today

Milwaukee Graphic Arts Exposition, Inc., Hotel Pfister, Milwaukee, Wis.

Send us announcement, space, application blank and diagram with full information of this Exposition.

Name .....

Address .....

City ..... State .....

Will You Help Solve the Problems of the Paper Industry?

THERE never were quite so many problems in the paper industry, all claiming attention at the same time, as right now.

There never was a time in the paper industry when strong, central headquarters, and on-the-job, up-to-the-minute, masterful, directive, problem-solving leadership was as much needed as right now!

What are some of these problems? First and foremost is overproduction.

Due to the stimulus of the war, production in paper in this country was largely augmented; in 1919 the production of all classes of paper was 6,190,000 tons. In 1920 we produced 7,335,000 tons—a jump of over a million tons in one year. In 1921 it dropped back to 5,356,000 tons due to the heavy deflation of that year. In 1922 production again jumped up to 7,017,000 tons, and in 1923 it was 7,200,000 tons. During the last six months of 1923 some eight additional chemical fibre mills came into operation in the United States, and five more are in prospect for 1924.

Paper production for the four years 1920 to 1924 inclusive is at the rate of 6,727,000 tons per annum, whereas from 1914 to 1919 the average was in the neighborhood of 5,500,000 tons. The increased production has been heavy and excessive, but it could have been absorbed and leave a very healthy market in the United States except for the fact of the second problem we are now facing, namely, excessive imports.

In 1922 the total imports of paper of all grades into the United States was, in round figures, $85,855,000. The imports in 1923 rose to the tremendous sum of $116,137,795—an increase of over $30,000,000 in one year, and that on top of a market sick from an attempt to absorb its heavy overproduction. In addition to the heavy overproduction of paper and excessive imports of paper, we have the problem of excessive imports of pulp and the heavy imports of pulpwood. The pulp imports last year into the United States were in round figures 39 per cent of the total production of pulp in the country, and the imports of pulp wood were, in round figures, 40 per cent greater than the year 1922.

These problems of domestic overproduction and excessive importation of both chemical and mechanical pulp as well as the finished paper are sufficient in themselves to produce the great variety of problems which we find confronting us today in the paper industry. In addition to these problems we have those connected with the basic change going on in the wrapping paper division, where the pronounced preference by users and consumers of wrapping paper is in favor of papers made from sulphate pulp instead of sulphite pulp. The manufacturers of ground wood and sulphite wrappings find themselves today with only 50 per cent of the market which they enjoyed fourteen years ago, and yet the paper and pulp mill installations for the manufacture of these sulphite and ground wood papers is somewhat larger than it was fourteen years ago, when they had twice the tonnage demand that they have for their papers today. What is going to become of this excessive installation? Who is paying any attention to the solving of these basic problems? Who are the interested parties and how can the problems be solved?

(*Continued on Page* 1825)

Cut Plant Painting Costs

These Three Essentials Save You 30% to 50% on Plant Painting

Vortex paints are full bodied oil paints of the highest quality for interior or exterior use. They are specially prepared for mechanical application.

A handy man at your plant can easily operate the equipment and we will instruct him how to handle it properly.

We loan you the Vortex Equipment. It operates on a different principle than ordinary spray painters —longer range, greater speed, and confined paint delivery make for better, cleaner and less costly results.

VORTEX PAINT

YOUR MAN

OUR DEMONSTRATION OFFER

If you have painting to do we will send Paint, Vortex Equipment and a Demonstrator to your Plant to show you just what we have. If you do not approve the demonstration you may send everything back to us and you will have incurred no expense. Write us now.

VORTEX PAINTER EQUIPMENT

The Vortex Method is different. A good many Plants have increased their Light and Production by this low cost system—

The VORTEX MANUFACTURING CO · CLEVELAND · O

These are some of the questions we are hearing from all quarters these days. The United States has only one-seventeenth of the population of the world, yet this country consumes one-half of the paper production of the world. It presents to the world today the biggest consuming market for paper on earth. We use the word "Presents" in its literal sense, for the other paper-making countries of the world are swamping this country with their paper products, because it is the only market in the world to which they can ship such products and get good, hard American dollars for it. There are people in the paper industry who believe that the American paper market existed primarily for the sustenance of the American paper manufacturer, but neither the publicists, our congressmen, nor the public at large, nor the paper mill manufacturers seem to think so, for although we have custom laws and duties on some classes of paper, yet there is none on newsprint, of which there was imported last year almost $100,000,000 worth without duty. It is freely charged that a great deal of higher grade paper has come into this country falsely classified which ought to pay duty, but which came in as newsprint and was sold for the higher grade paper at prices under cost figures of the American producers.

Go to almost any Eastern or Southern town in the United States of any importance and here is what you will see—merchants and manufacturers paying good, American money to buy advertising in supposedly American papers, all of which advertising is printed upon German or other foreign newsprint. If you will walk down the streets of these towns you will see hordes of shoppers pouring forth from the stores and shops, bearing home purchases wrapped up in foreign paper, and it is freely charged that a great deal of this wrapping paper comes in falsely classified and pays little or no duty, the only beneficiary being the foreign manufacturer, foreign labor, and foreign government and the pirate importers, the sufferers being the American manufacturer, the American workman, and the American Government.

This import question is the livest problem in the present situation. The import evasions and abuses have been going on for past years and are still going on at a constantly increasing rate. Up to date nobody has made any investigation or taken any steps toward an investigation except one man in New York who recently had the nerve to propose a plan of investigation, only to have it immediately "sat upon" by people who believe it is their prerogative to do it, and yet have not moved a finger to remedy the situation.

It is time something was done. The American paper mill manufacturers and the American paper merchants are to hold their conclave in New York City on April 8th, and we hope that every mill man and every decent American paper merchant will go to that convention, determined to support some aggressive, collective, intelligent plan for an immediate survey, particularly of the import situation.

There is not a paper manufacturer in the United States who does not know, to his sorrow, that import papers and foreign-made paper products are being dumped into this country contrary to law and for the sole purpose of depriving the American paper manufacturer, American labor in those mills, and the American paper merchant of their markets.

What is everybody's knowledge is nobody's business. We all know that the American paper market is facing domination by the foreigners. Are there enough red-blooded American manufacturers in the country to put up a winning fight for it?

Shuler & Benninghofen

Miami Woolen Mills HAMILTON, OHIO

ESTABLISHED EIGHTEEN FIFTY-EIGHT

PIONEER manufacturers of American felts for paper makers' use. We manufacture felts suitable for use in making every variety of paper, pulp or board. Seamless woven felts. Cylinder Wet Felts for "nine points" straw. Top and bottom felts for fast running machines on board. Super Fine Fourd. Wet and Press felts for writing, book and bond papers. Hamilton Sateen Weave Top and Bottom felts with a one-sided finish for board give better satisfaction to the user than any other make of one-sided finish felts. They run longer and never "roll on the edge." For use in combination with the Sateen Weave felts we recommend our "A" Plate Press felts. These latter stand at the head of the Plate Press felt class. Board makers use our "A" Plate Press felts in preference to one-sided Press felts, as both sides of the "A" Plate Press felt can be used. Besides there is no danger of making badly marked board at night, after roping and washing our "A" Plate Press felt, should the latter be turned bottom side up.

Samples of felts and jackets will be submitted and prices on your sizes will be quoted upon request.

SIMONDS SAW AND STEEL COMPANY

ESTABLISHED 1832

The Largest Machine Knife Makers in the World

1624 South Western Avenue, Chicago, Ill. St. Remi St. and Acorn Ave., Montreal, Que.
Fitchburg, Mass.

New Orleans, La. Detroit, Mich. Memphis, Tenn. Lockport, N. Y. Portland, Ore. Seattle, Wash. San Francisco, Cal. Vancouver, B. C. New York City London, England St. John, N. B.

PRODUCTS: Knives—anvil, barker, chipper, hog, paper, planer, rag, stop cutter; Saws—band, circular, drag, hack, inserted tooth; Bed Plates; Circular Cutters; Circular Slitters; Files; Doctor Blades.

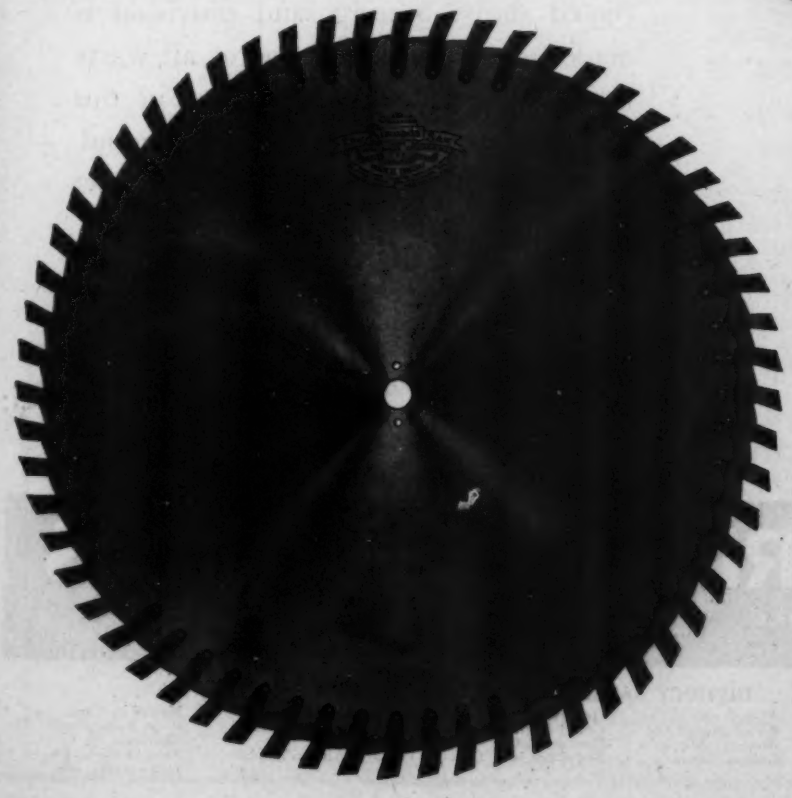
BARKER KNIVES

When ordering Barker Knives, state number wanted, number of sets, number in set, length, width and thickness. Give name and number of machine.

PAPER TRIMMING KNIFE

FILES

A large stock of mill and machine shop files on hand. Orders filled promptly. Include in your next order a dozen of the Simonds Special Cross-Cut Saw Files. Outwear other styles for Cross-Cut or Circular Saw Filing.



CHIPPER KNIVES

Made either Solid Steel or Plated Carbon Steel. When ordering give number of knives wanted; length, width and thickness, number and make of machine, also send sketch of old knife to show size and position of slots. State whether you want regular edge or double angle edge knives.

PAPER TRIMMING KNIVES

Highest grade steel to hold a cutting edge. When ordering be sure to state the name of your cutter machine, give total length of knife, width, thickness, width of bevel. Give number of holes, diameter of holes, and number of threads to inch. Also the distance in inches from back of knife to center of holes.

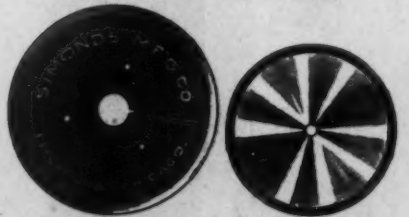
HOG, RAG, ETC., KNIVES

We also manufacture a complete line of Hog, Rag, Planer, and Stop Cutter Knives, Bed Plates and Doctor Blades. Write our nearest office for particulars.

SIMONDS HARD EDGE HACK SAW BLADES

Blades are non-breaking and for general use are the best, most serviceable, and economical blades on the market. In stock in all standard sizes.

CIRCULAR CUTTERS



CIRCULAR CUTTER CIRCULAR SLITTER

Simonds Circular Knives are made of finest saw steel. When sending your order give diameter, thickness, size of hole, whether beveled on one or both sides and how deep bevel is to run.

INSERTED TOOTH CUT-OFF SAW

This style Inserted Tooth Cut-Off Saw made any diameter, 36" to 96", has repeatedly demonstrated its economy in large pump mills. The teeth stay in. They are easily renewed. The saw always remains the same diameter. It makes a smooth, fast cut. Write for prices, giving size saw you are interested in. We also manufacture all styles and sizes of Solid Tooth Circular Saws, Drag Saws, and Band Saws.

AMERICAN
AURORA, ILL.

Announcing the "American" Totally Enclosed Deep Well Turbine Head!

Totally enclosed, this new motor driven head has great rigidity of construction, and counteracts any vibration from moving parts in the turbine.

It is equipped with Kingsbury water cooled thrust bearing, and provision is made for complete drainage of all waste oils and water. The discharge in this new design is located below ground, which makes for an unusually compact and neat installation.

Easy access is had through two openings to the interior of the head.

Literature describing this new head is available; ask for it!

THE AMERICAN WELL WORKS

General Office and Works
AURORA, ILL.

Chicago Office
FIRST NATIONAL BANK BLDG

DISTRICT SALES AGENCIES:

New York City (*Domestic and Export*)
Philadelphia, Pa.
Pittsburgh, Pa.
Cleveland, Ohio
Detroit, Mich.
St. Paul, Minn.
St. Louis, Mo.
Kansas City, Mo.
Joplin, Mo.
Atlanta, Ga.
Birmingham, Ala.
Almyra, Ark.
Dallas, Texas
Omaha, Neb.
Grand Island, Neb.
Denver, Colo.
San Francisco, Cal.
Los Angeles, Cal.
Salt Lake City, Utah
Seattle, Wash.
Calgary, Alta., Canada
Edmonton, Alta., Canada
Memphis, Tenn.
West Palm Beach, Fla.
Charlotte, N. C.
New Orleans, La.
Jacksonville, Fla.

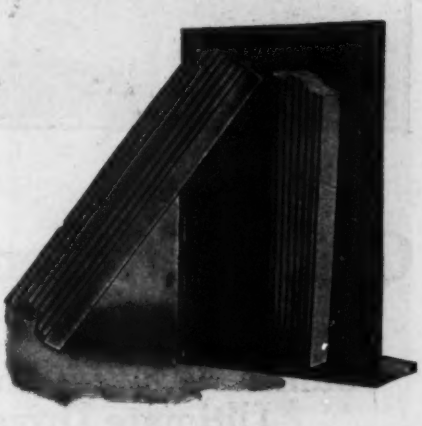
Flexible Tightness—

A Distinguishing Feature of

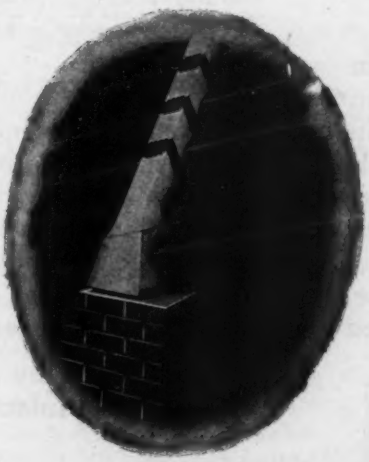
Turner Baffle Walls

TO be gas-tight is the first requirement of any baffle. But unless it is also flexible, the baffle cannot *remain tight permanently.*

Turner Baffle Walls *are* flexible. They are unharmed by the sudden temperature changes and severe firing conditions that would wreck a rigid wall. Their unique construction of Turner Tile and plastic allows for the expansion and contraction of the boiler tubes, the setting and the wall itself.



Turner Tile showing corrugated faces and dove-tail ends. The corrugations provide flexibility without sacrificing the tightness of the wall.



Detail of Construction, showing Turner Tile and plastic, footing blocks and stretcher course of fire brick. The joint between the bottom of the tube blocks and the top of the bridge wall can be left with or without clearance, as desired.

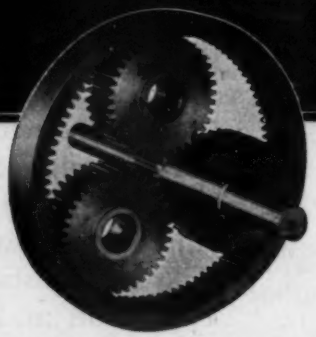
Because Turner Baffles can be built at any required angle to the tubes, they have made possible the correction of many serious operating difficulties.

Write for the "Turner Baffle Book". It is full of valuable information on the baffling and operation of water tube boilers.

The Engineer Company

17 Battery Place New York City

Branch Offices in the Larger Cities



Quiet - Efficient - Clean

James Reducers are the Ultimate Drive

Where cleanliness is necessary—in the manufacture of fine paper, in dairy and food establishments, in the manufacture of fine chemicals or dyes — any place where large belts or open gears may not be used because of probable spoilage of product through dust or grease, that's the place to use James Speed Reducers.

Efficient? Yes, of course!

The Gear Members of James Reducers are centrally balanced, and move in the same direction in an oil bath.

Their design eliminates overhanging strain. It reduces vibration and friction to a minimum. There are three times as many teeth in contact as in any other form of speed reduction.

But more than that, they're ***clean.***

They are self contained, and a specially constructed oiling system prevents the leakage of oil around shafts and assures absolute cleanliness where cleanliness is essential. Let us show you the advantages of James Speed Reducers.

They are backed by the guarantee of a pioneer manufacturer.

The D. O. James Manufacturing Co.

1120 W. Monroe Street, Chicago, Ill.

14

D.O.JAMES

Reducing Delays on Cutting Machines

Every operator on this long row of cutting machines in the Champion Coated Paper Mills has complete convenient control of the starting, speed adjusting, and stopping of the machine. And to eliminate troubles and delays—experience has shown this paper company that the Cutler-Hammer Constant Time Limit Acceleration Type Controllers are best suited.

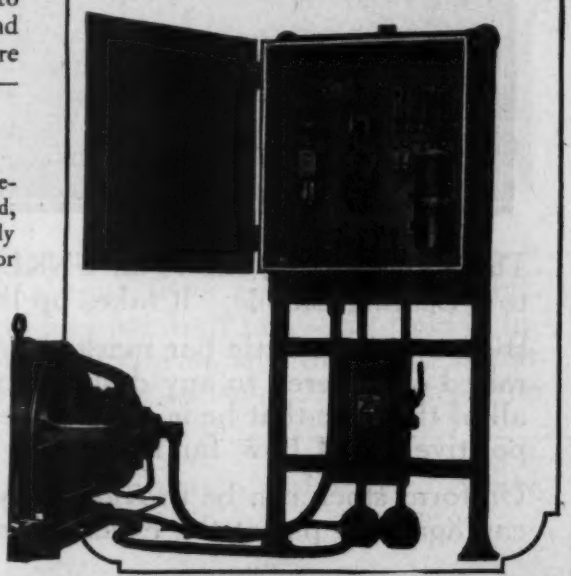
A definite accelerating period is selected and once the adjustment is made the motors are always brought up to speed in this time. The C-H Push Button Start and Stop Station and the Speed Adjusting Rheostat are placed to right and left of the operator, respectively—affording instant and convenient control.

C-H Push Button Start and Stop Station in circle at right; Speed Adjusting Rheostat at left of operator.

Motors and Operators Protected

Incorporated in the Controller design are the Protective Devices which prevent damage to the motor due to overloads and, in case of power coming on after an interruption of the supply—the No-Voltage Release Relay prevents injury to operator following unexpected starting of the motor and cutter. After the power is off, the "Start" button of the push button station must be pressed.

For every motor application, there is a type of Cutler-Hammer Starter or Controller that best meets conditions and gives the user the results desired. Any of the C-H offices are ready to give you detailed information promptly.



Close-up of one of the 20 C-H Automatic Controllers mounted on gallery with Reliance motors driving cutting machines.

THE CUTLER-HAMMER MFG. CO.
Motor Control Department
Works: MILWAUKEE *and* NEW YORK
Offices and Agents in Principal Cities
Northern Electric Co., Ltd., Canada

C-H CUTLER-HAMMER **AUTOMATIC CONTROLLERS**

Don't Guess—Know!

The Great Demand of the Paper Industry today is "Speed Up Production," without consequent increase in the costs of Power and Labor.

The above picture shows an UNKLE IMPROVED ROLL RAISER attached to a Beating Engine. It takes up little room, but accomplishes big results.

By moving the little bar marked "A," the roll on any Beating Engine can be raised or lowered to any desired position, so that the beater engineer **knows** all of the time that he is getting the best possible production. He also knows positively just how far the roll is from the Bed Plate.

Uniform stock can be provided day in and day out, and if changed, the roll can again be put at the exact place required, in a minute.

Griley-Unkle Engineering Co.

First National Bank Building, Fort Wayne, Indiana

Speed Up Production

This Speeds Up Production, gives the exact stock desired, eliminates all accidents and many shut downs.

It costs money to furnish Power for a Beating Engine these days. Isn't it desirable, then, to get the largest possible output from each beater? THE UNKLE IMPROVED ROLL RAISER will pay for itself in a short time in Increased Production, not mentioning More Uniform, and therefore Better Beating, the elimination of accidents, and the time consumed to change the roll as is done in all mills today.

We will be pleased to give you more detailed information and prices. Please write us now.

Griley-Unkle Engineering Co.

First National Bank Building, Fort Wayne, Indiana

Reached 83 tons production in first month of operation !

Table shows production record during first seven days' run of **New 230" "Dominion" Machine for Belgo Company**

DATE	Total Hours Run	Speed Feet Per Min.	Machine Efficiency %	Production Commercial Paper Tons
5th Jan. 4:00 P.M. to 5:00 P.M.	1	620	....	3.16
7th Jan. 11:00 P.M. to 8th Jan. 11:00 P.M.	24	620	55.6	47.32
8th Jan. 11:00 P.M. to 9th Jan. 11:00 P.M.	24	620	78.7	67.94
9th Jan. 11:00 P.M. to 10th Jan. 11:00 P.M.	24	610	84.2	71.21
10th Jan. 11:00 P.M. to 11th Jan. 11:00 P.M.	22	610—675 (Speed changed at noon)	75.4	65.65
11th Jan. 11:00 P.M. to 12th Jan. 11:00 P.M.	24	675	80.7	75.41
*12th Jan. 11:00 P.M. to 14th Jan. 11:00 P.M.	24	675	72.0	62.73

DOMINION ENGINEERING WORKS
LIMITED
MONTREAL · CANADA

Compared with ALL OTHER methods of couching paper on Fourdrinier Machines the

KENWOOD GUARD BOARD and KENWOOD TAN JACKETS COMBINATION IS BEST

That is a strong statement—but the PROOF is strong. Actual running experience indicates that this combination develops the maximum of production with greatest freedom from breaks at lowest couching cost of ANY method. Comparatively inexpensive to install.

We shall be glad to explain in detail these remarkable economies and production results.

F. C. HUYCK & SONS

KENWOOD MILLS,
Albany, N. Y.

KENWOOD
WOOL PRODUCTS

KENWOOD MILLS LTD.
Arnprior, Ontario, Canada

This Pipe
—for quick installation
—for better service

HERE is the ideal pipe for paper mills —a fact that is confirmed by a long list of users in the paper industry.

It comes to your plant ready fabricated—made to your exact specifications by an old-established organization that is known for accuracy in following instructions. This means quick installation and economy in erection.

Each length of Taylor Spiral Riveted Pipe is tested by a pressure 50 per cent in excess of the specified pressure. The spiral riveted seam is the strongest part of the pipe—proved by tests. Pipe of this kind is much stronger than other type of equal gauge.

The pipe is furnished with forged steel flanges. These flanges are practically unbreakable and therefore they are more firmly attached to the pipe. There is no danger of breaking flanges in installing the pipe and breakage in service is impossible. Heavily galvanized by the "Hot Process" in pure molten zinc, Taylor Spiral Riveted Pipe will last indefinitely.

Sizes 3 to 42 inches. Special fittings of every description. Pipe is also asphalt coated if desired. Ask for complete specifications and diagrams of fittings.

TAYLOR
Spiral Riveted
STEEL PIPE

Manufactured by:

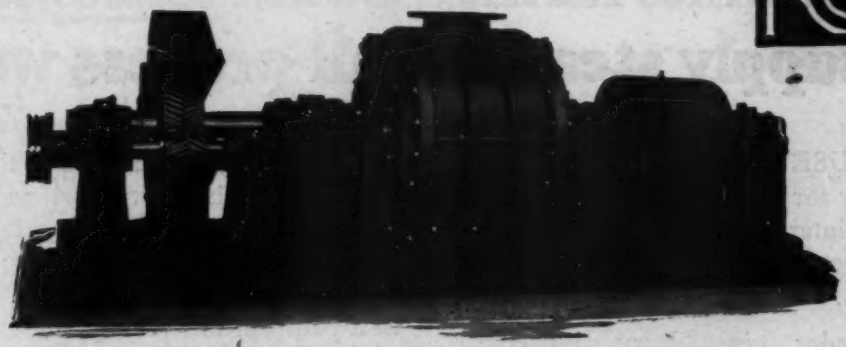
American Spiral Pipe Works

Main Office and Works:

P. O. Box 485, Chicago, Ill.

New York Office: 50 Church St., New York, N. Y.

ROOTS



These Vacuum Pumps Meet Your Requirements Fully

ROOTS Rotary Vacuum pumps were especially designed for paper and pulp mill use. Paper and pulp mill engineers have specified simplicity, strength, ease of adjustment and repair, and positive operation as outstanding qualities to be considered in the purchase of pumps. Roots pumps meet these requirements fully — and in many ways beat them.

Roots Rotary Vacuum Pumps provide positive displacement with power consumption in direct proportion to the speed and vacuum. Water is not churned around the case to cause excessive power without doing useful work. There is, therefore, a direct saving over other vacuum pumps which soon pays the difference in first cost.

We know of Roots Pumps operating in paper and pulp mills under conditions that would be impossible with other types of pumping equipment.

Bulletins describing Roots Equipment for paper and pulp mills will be sent on request.

Forms of Drive

Roots Rotary Vacuum Pumps can be arranged for any form of drive that is best suited for the installation. They are essentially slow speed machines and where steam is available they are best driven by means of flexible coupling from steam engines. They are ordinarily equipped with pulleys so that they can be belted to any convenient form of power. Where motor drive is required, some speed reduction is necessary, such as silent chain or gears. We recommend that your inquiry state the form of drive that you would prefer.

ROOTS
ROTARY POSITIVE BLOWERS
GAS EXHAUSTERS
PUMPS AND VACUUM PUMPS
FLEXIBLE COUPLINGS
BLAST GATES
RELIEF VALVES
FEED DEVICES
GOVERNORS
PRODUCTS

The P.H.&F.M. ROOTS CO.

DEPT. 18
CONNERSVILLE, IND.

Chicago Office 128 S. Michigan Ave.
New York Office Room 808-120 Liberty St

Terry Turbines furnish power *economically* and supply steam for all process work

BECAUSE of their known dependability for day-in and day-out service without interruption, Terry Turbines were selected for the C. H. Dexter & Sons, Inc., Paper Mill.

The bleeder type Terry, illustrated below, drives a 500-kw. alternator and supplies steam at from 5 to 40 pounds pressure for heating the rolls. This low-pressure steam is always free from oil, which is a distinct advantage for work of this kind.

This Terry Turbine takes the place of a 450-kw. reciprocating engine set which has a higher steam consumption and which occupies at least four times the space. While the Terry Turbine has been in operation a comparatively short time, it has already effected a saving in coal and oil. A small Terry drives the hot-well pump in this same plant.

Terry Turbines are the ultimate choice of engineers the country over. Surely you can make no mistake in selecting *the* turbine which a majority of men join you in approving.

A Terry Engineer will be glad to tell you more about the economies you can derive from a Terry Turbine, and its application to your particular needs.

THE TERRY STEAM TURBINE COMPANY
Terry Square, Hartford, Conn.
Offices in Principal Cities in the U. S. A.
Also in Important Industrial Foreign Countries.

T-906-B

These four 600 H. P. oil-fired Edge Moor Boilers are helping American Agricultural Chemical Co. to keep power costs at the lowest level in their plant at Pierce, Fla.

"First Cost" Alone Means Little—*Ultimate* Cost is the Important Consideration

—Especially when you are buying boilers which you expect to last a lifetime.

The efficiency of your boilers over their period of service determines their cost to you—not the price quoted by the maker.

The difference in first cost is frequently offset in the first few years of service. It is easy to determine, for example, the saving in fuel you could effect by increasing your boiler efficiency 2% or 5% or 10%.

Edge Moor Boilers are built to deliver the highest practical efficiency under any given set of operating conditions.

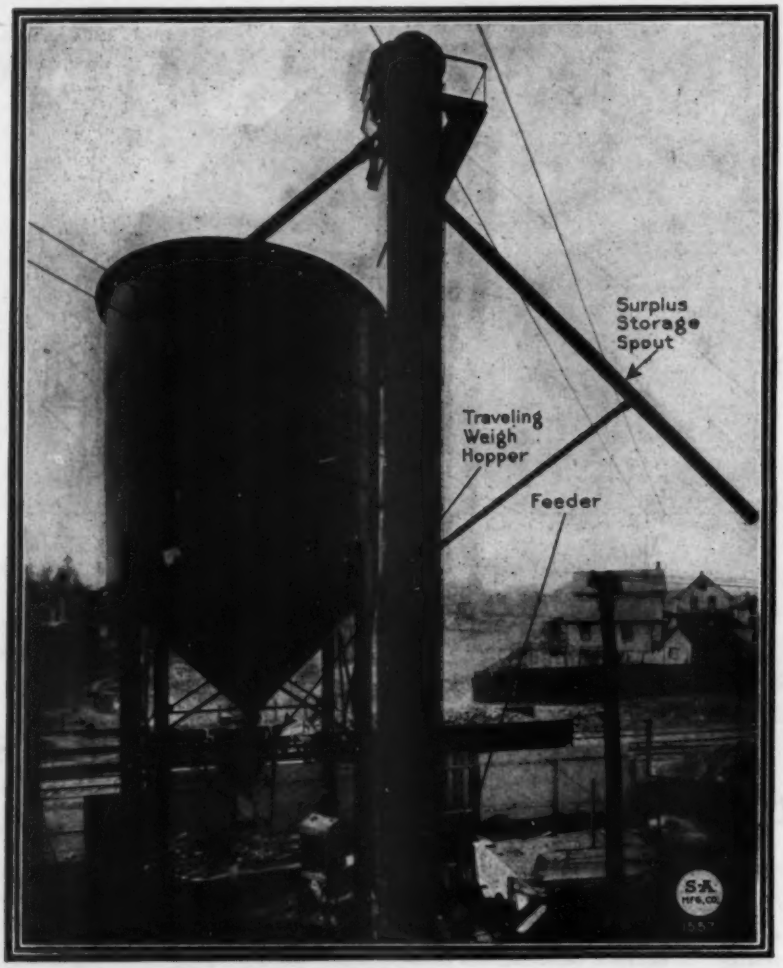
In choosing the boilers for your new power plant, consider the ultimate cost. The Edge Moor catalogue will help you to determine the figures; shall we send you a copy?

EDGE MOOR IRON COMPANY
Established 1868
EDGE MOOR, DELAWARE
New York Chicago St. Paul Boston Pittsburgh Charlotte

EDGE MOOR Water Tube BOILERS

EDGE MOOR BOILERS EDGE MOOR, DEL. U.S.A.

FOR INCREASED FUEL ECONOMY



Does It Cost to Operate
or
Does It Pay to Operate

? Answer the question for yourself after reviewing the cost of handling your coal from the cars to the boilers. Every boiler room should be equipped with modern labor saving machinery for handling coal.

Send a sketch and description of your boiler room and secure the recommendation of an S-A Engineer.

STEPHENS-ADAMSON MFG. CO., Aurora, Ill.

Browning and American Bridge Company

IN the development of this vast country the American Bridge Company has played no small part. Spanning numerous rivers, bridging innumerable of nature's low spots for our railroads and highways and serving industry with skilled steel fabrication, the American Bridge Co. has been a constructive force in American Industrial history.

To serve industry better and more economically, savings in material handling have been a necessity. The use of Browning Locomotive Cranes to effect these savings is most gratifying to us. We are proud of the choice of Brownings by the American Bridge Company—as we are of their use by dozens of other nationally famous concerns.

For *your* heavy material handling a Browning will prove as unquestioned an economy, as they have for numerous other firms. Regardless of how large or how small your plant may be, if the material handling problem enters, specify Browning and be sure of life-long service and proven economy.

Write for descriptive catalogue and complete details. Our engineers will be glad to work with you—and there is no obligation.

THE BROWNING COMPANY

16226 Waterloo Rd.
CLEVELAND, OHIO, U. S. A.

New York
50 Church Street

Chicago
664 Peoples Gas Bldg.

Sales Agents:

SEATTLE
PORTLAND
SALT LAKE CITY
LOS ANGELES
SAN FRANCISCO
MONTREAL
WASHINGTON, D. C.
BIRMINGHAM

BROWNING
LOCOMOTIVE CRANES

HARLAND

Drive on Laurentide High Speed Newsprint Machine

Sectional Electric Drive

THE FIRST SUCCESSFUL METHOD OF CONTROL FOR DRIVING PAPER MACHINES BY SECTIONAL ELECTRIC MOTORS

24 Drives in Operation and on Order

Still Foremost

Ask the Users About Results

WE CAN NOW QUOTE FOR THIS EQUIPMENT MADE IN U. S. A.

The Harland Engineering Co. of Canada Limited——Montreal

Confidence Justified

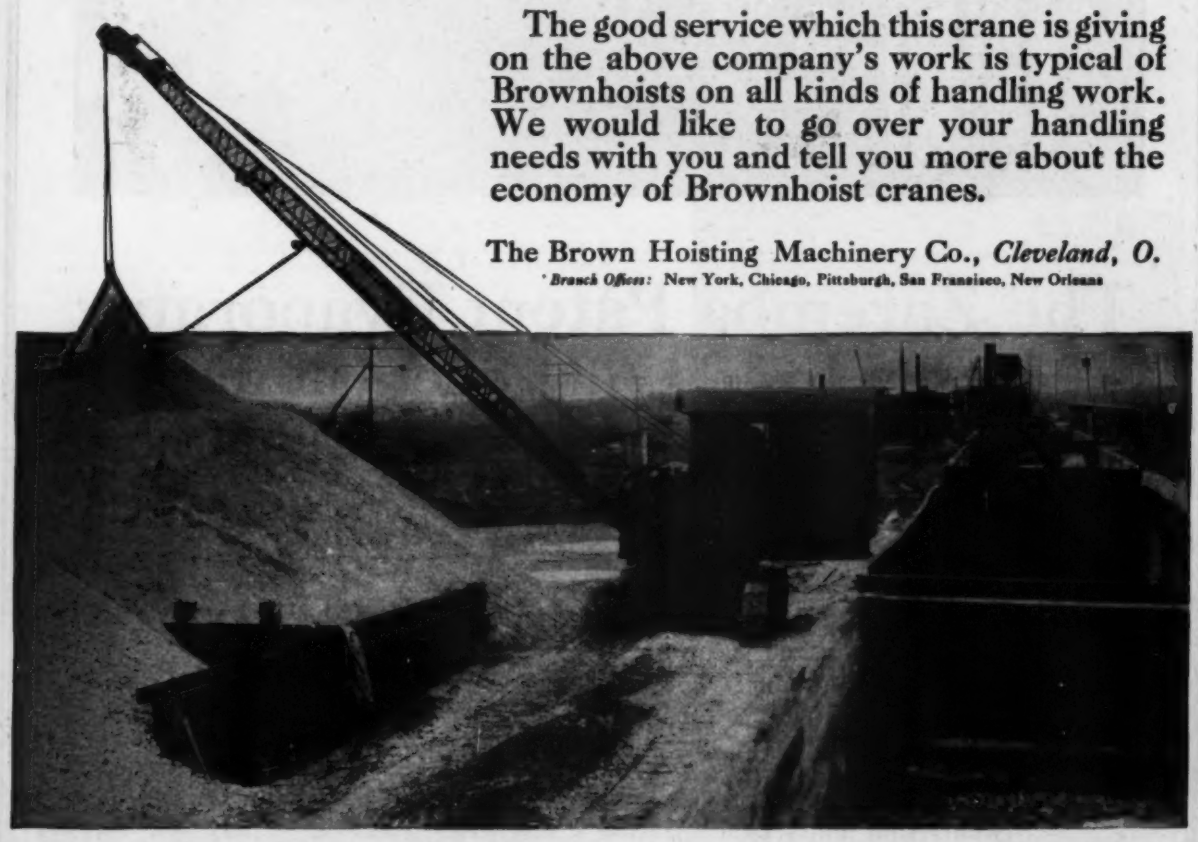
CONFIDENCE, whether it be in an individual or a locomotive crane always gives a feeling of deep satisfaction. The confidence which the Houston Construction Company have in their No. 2 Brownhoist creeper truck crane has been justified by the economical and dependable service which their crane has given them.

The Houston Company say of their crane, "After quite a bit of investigation we purchased a Brownhoist because we consider it the best built machine on the market. We are indeed highly pleased with its operation and don't think anyone can make a mistake in purchasing a machine of this kind."

The good service which this crane is giving on the above company's work is typical of Brownhoists on all kinds of handling work. We would like to go over your handling needs with you and tell you more about the economy of Brownhoist cranes.

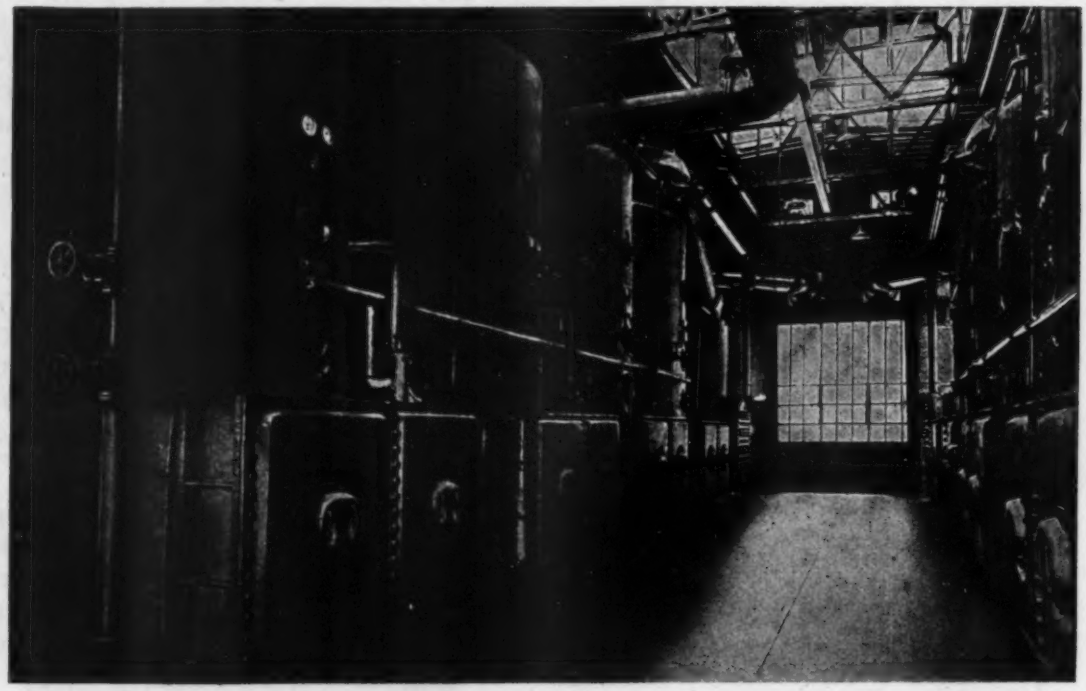
The Brown Hoisting Machinery Co., *Cleveland, O.*

Branch Offices: New York, Chicago, Pittsburgh, San Francisco, New Orleans



BROWNHOIST

MATERIAL HANDLING MACHINERY



The Zaremba Patent Evaporator
Easily Excels All Others in the Concentration of Black Liquor

THE equipment shown comprises two Zaremba Patent Quadruple Effects installed in the Covington (Va.) Mill of the West Virginia Pulp & Paper Company. The bodies are ten feet diameter by sixteen feet high. First and second effects are fitted with Multiport Separators, third and fourth effects fitted with Hughes Centrifugal Separators. Each Quadruple Effect is supplied with Surface and Barometric Condensers.

Capacity of installation is 350,000 gallons black liquor per twenty-four hours, concentrating from 8° Be. to 34° Be. Entrainment Loss as determined in service is one-tenth of one per cent.

ZAREMBA COMPANY

508 Crosby Bldg. Buffalo, N. Y.

EQUIPMENT FOR THE PAPER INDUSTRY
FROM
ACID PROOF CHEMICAL STONEWARE

MAURICE A. KNIGHT

OFFICE & FACTORY
KELLY AVENUE

AKRON, OHIO

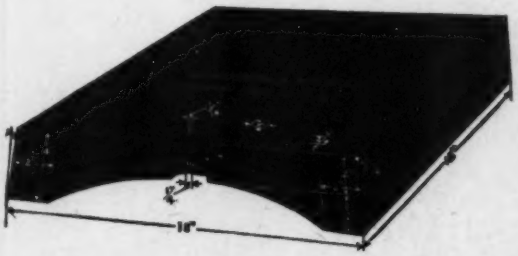


Figure 140-B
Acid Proof Drainer or Blow Pit Tile

Acid Proof Drainer or Blow Pit Tile Figure 140-B is designed primarily for use as a false bottom in blow pits in pulp mills, but finds many other uses where a perforated false bottom is required. The holes can be made of any diameter and set as close together as wanted, and of either the straight or taper type (self-cleaning non-clogging). The arch construction gives this type of perforated tile greater strength than the flat type shown under No. 138. Advise your requirements as to design, size and number and bore and spacing of holes.

Standard or usual sizes are:
12" long, 6" wide, 2" thick.
18" long, 12" wide, 3" thick.
18" long, 18" wide, 4" thick.

Large Acid Proof Tower Base Tile. Figure 136

Standard Sizes:
3" x 15" x 30".
4" x 18" x 36".
6" x 24" x 42".

Also made to order in sizes as required. Send us measurements.

Used as base tile to support packing in large sulphuric acid and similar towers. Made of the same materials as our chemical stoneware apparatus and are acid proof throughout the entire body, and the body is tough and impervious. Not carried in stock but made up as required. No extra cost.

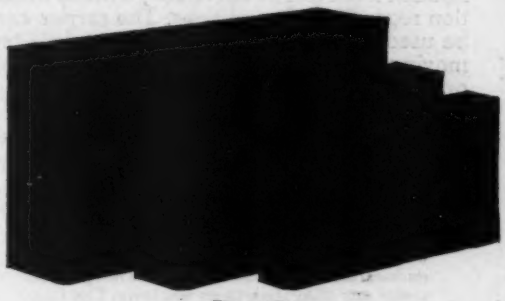


Figure 136
Large Acid Proof Tower Base Tile

We make *every description* of Acid Proof Chemical Stoneware from special pieces to complete plants.

Figure 132
Acid Proof Partition Rings

Acid Proof Curved Partition Rings
Figure 132—Carried in Stock—3 Sizes

Sizes	6"x6"	6"x4"	4"x3"
Weight each, pounds	8	5½	2½
Number to a cubic foot	8	12	36
Minimum carload	6,250	10,000	20,000
Number to a barrel	30	46	100
TOWERS:			
To a 24" x 24" section	45	70	175
To a 30" x 24" section	75	115	360
To a 36" x 24" section	110	160	415
To a 40" x 24" section	130	325	620

We also make these rings plain without partitions.

It is usual practice in packing a tower with these rings to use the 6" x 6" for the bottom ⅓, the 6" x 4" for the center ⅓ and the 4" x 3" for the top ⅓—the smaller packing being at the top where the gases occupy less room due to cooling and absorption. This packing will not clog or channel.

Our ware is GUARANTEED to be acid and corrosion proof throughout its entire body, not depending upon a glaze, enamel or veneer for its acid resisting qualities.

"It Is in the Body Itself"

"Saving 40% Labor in Paper Stock Room Alone"

Savings in labor cost—savings in time—savings in material by the Louden Overhead Carrying System are strikingly shown by the report of the Engineering Department of the Egry Register Company at Dayton, Ohio.

"In the Roll Paper Stock room alone" says the report "the Louden System shows a saving of 40%. In the reduction of operating costs by the quick dispatch of material it shows a saving of 8%. In prevention of waste by eliminating damage to rolls a big saving is also apparent."

LOUDEN

OVERHEAD CARRYING SYSTEM

is especially effective in practically every carrying problem of pulp and paper mills—as installations in use conclusively prove.

Louden track can be curved to go in any direction regardless of conditions. The carrier can be used for bringing in wood for pulp—for moving wet laps to storage—for carrying laps or rolls of pulp to beater room—for carrying rolls to required position in front of machines—for delivery to storage, or shipping rooms.

The Louden easily handles loads up to 2,000 pounds—clears your floors of trucking confusion; and saves wear.

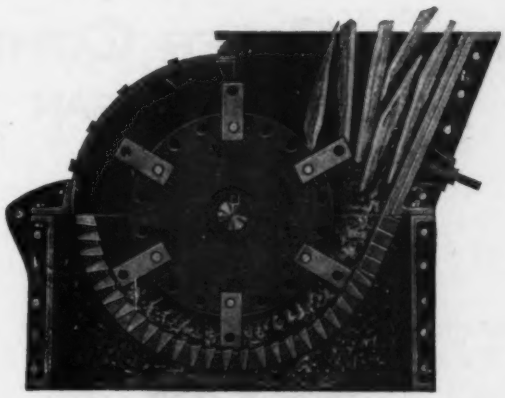
Let us consider with you the conditions under which you move the loads in your plant. Ask our nearest branch office. This does not put you under any obligation to us whatever. The Louden is saving money for others. The cost of installation is astonishingly low. Write for catalog.

The Louden Machinery Company

572 West Ave. (Established 1867) Fairfield, Iowa

Branch Offices: Albany Boston New York Philadelphia Buffalo Pittsburgh Cincinnati Cleveland Chicago St. Paul Los Angeles San Francisco

Photograph shows part of Louden installation at plant of the A. P. W. Paper Company, Albany, N.Y. Carrier on track scales. Photograph also shows method of suspending Louden Overhead track under waste pipe in background.



"Gruendler Paper Stock *and* Pulp Shredder"

IN addition to the Gruendler Famous Ball-Bearing Coal Crusher, we manufacture a Ball-Bearing Shredder and Refiner, to handle Dry or Frozen Pulp Laps, Magazines, Box Board, Straw, Chemical Pulp direct from digester, Wood refuse, Bark, etc. Dry products can be handled by our transport system, wet stock by vacuum pumps.

Take the Load off your Beater, speed up Hydration and Save Power.

GRUENDLER PATENT CRUSHER AND PULVERIZER CO.

Manufacturers of Crushing, Pulverizing, Shredding, Screening Elevators and Engineering Machines.

938 NORTH 1st STREET ST. LOUIS, MISSOURI

Sales offices in all principal cities

MUNISING PAPER COMPANY

MUNISING MICHIGAN

MANUFACTURERS OF

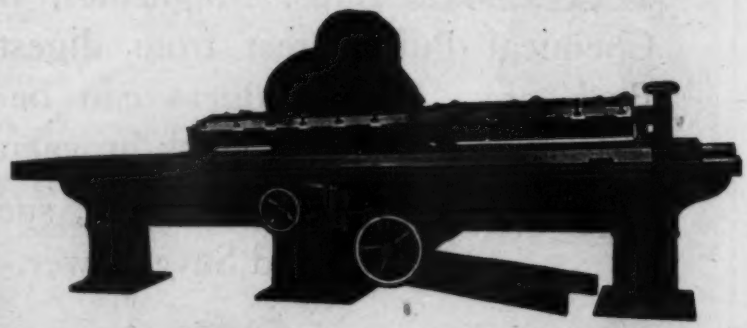
MUNISING M BOND

COLOR QUALITY AND UNIFORMITY
HAVE MADE FOR IT
AN ENVIABLE REPUTATION

Bridgeport Sectional Wheel Knife Grinder

Mr. Superintendent:

Ever have any trouble with your paper cutting knives because they were not properly sharpened? Fortunate you are if you never did. Most of this is due to grinding on light machines. Knives can be ground straight and true. They are every day, but it takes a strong, rigid machine to do it and do it right.



Note the cut of the Bridgeport Safety Sectional Wheel Knife Grinder. The heavy carriage, running on wide flat ways on a strong base, gibbed to take up for wear; the grinding wheel head runs on a large spindle and in ball bearing boxes, mounted on a heavy back extension. These things mean rigidity and freedom from vibration and result in perfect grinding. It is a real pleasure to take a knife from one of these machines and put on the press without shimming and springing. The grinders are equally good for pulp knives.

The Sectional Grinding Wheel assures cool grinding and more of it, with less power. The space between the sections overcomes much of the trouble of ring wheels and reduces power consumption up to 50%.

May we tell you more of these machines? Our catalog is yours for the asking and

KNIVES GROUND TRUE

the result of using the Bridgeport Safety Sectional Wheel Grinder.

BRIDGEPORT SAFETY EMERY WHEEL CO.

102 Knowlton Street BRIDGEPORT, CONN.

The New Year And Its Opportunities

THE man big enough to measure up to 1924 will have to be pretty sizeable. For everything points to Commercial Progress of a very positive, sure-fire order. The fellow with the Mazda spark and the ninety horsepower spirit is destined for fine records. To make a product just a little better than someone else can make it, is the ideal and aim of every paper manufacturer. Anything that aids in that achievement is ever welcome.

The leading paper manufacturers of America have found Appleton Felts and Jackets an every-day help in producing more paper and better paper. These quality products have pointed the way to true economy in paper manufacture for 33 years.

Appleton quality is well-known. Appleton service is dependable.

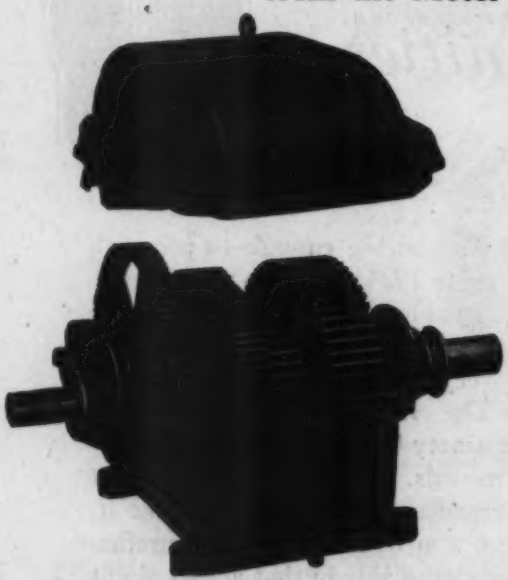
Why not let us show you how they can promote and profit your success in 1924?

Appleton Woolen Mills
Appleton, Wis.

Appleton
Felts and Jackets

Palmer-Bee TRADE MILL MARK TYPE Speed Reducers

Insure a Quiet, Steady, Dependable Flow of Power, Free from Vibration from the Motor to the Driven Machine



Patent Applied For

Cover Removed—Real Accessibility!

These qualities—so desirable in Paper Mills—are the natural results to be expected from a reducing mechanism constructed with **wide** face, **coarse** pitch gears, assembled on heavy **through** shafts, supported in bearings at each end, the entire inner mechanism running in an **Oil Bath,** and being enclosed in an **Oil-Tight, Dust-Proof** casing.

Palmer-Bee Reducers have no gyrating planetary pinions, internal gears, diaphragms, floating discs or overhung studs—these objectionable features of the average reducer have been eliminated.

One glance at this simply constructed, ruggedly built reducer will convince you that it is a product which merits your earnest consideration.

Why not let our Engineering Department recommend and quote on a suitable installation to take care of your requirements? Ask for Bulletin No. 42.

Ratios from 3 to 1 up to 4000 to 1. Range of Horsepower 1/4 to 200.

Palmer-Bee Company

Detroit, Michigan

Plant No. 1
2778-2804 E. Grand Blvd.

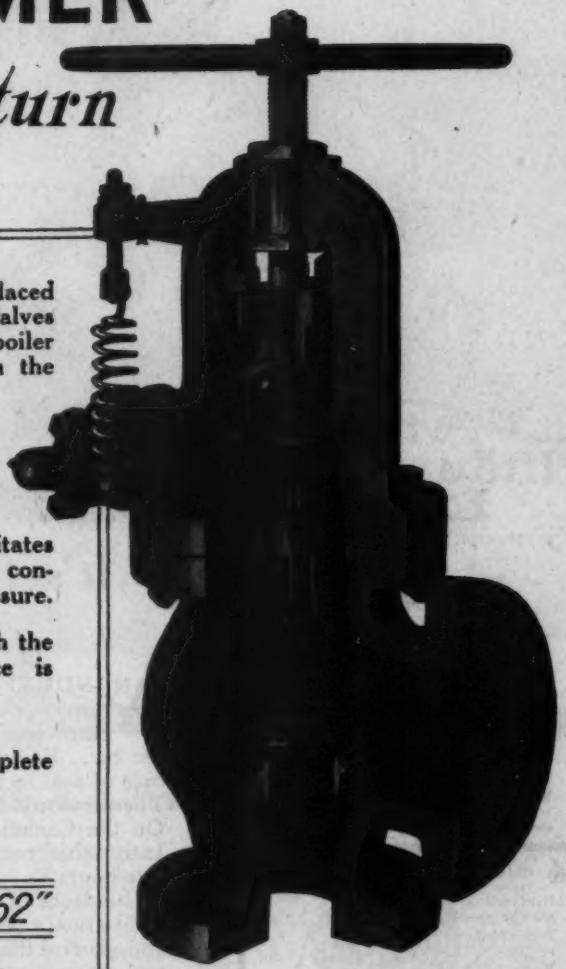
Plant No. 2
7341-7403 Orleans St.

Robert L. Latimer & Co.

24 AND 26 N. FRONT ST. - PHILADELPHIA

LUNKENHEIMER

Safety Non-Return Valves



Positive dependence can be placed upon the prompt closing of these Valves should the pressure within the boiler suddenly drop below that in the header.

There being no internal dash pot, the disc is free in action and does not stick or bind. Chattering is eliminated by the outside spring mechanism which facilitates instant adjustment to meet any condition while the valve is under pressure.

Efficient prolonged service with the utmost economy of maintenance is assured.

Booklet 525 FG contains complete information. Write for a copy.

"America's Best since 1862"

THE LUNKENHEIMER CO.
"QUALITY"
LARGEST MANUFACTURERS OF HIGH GRADE ENGINEERING SPECIALTIES IN THE WORLD
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Essential for the safe operation of boilers connected in battery

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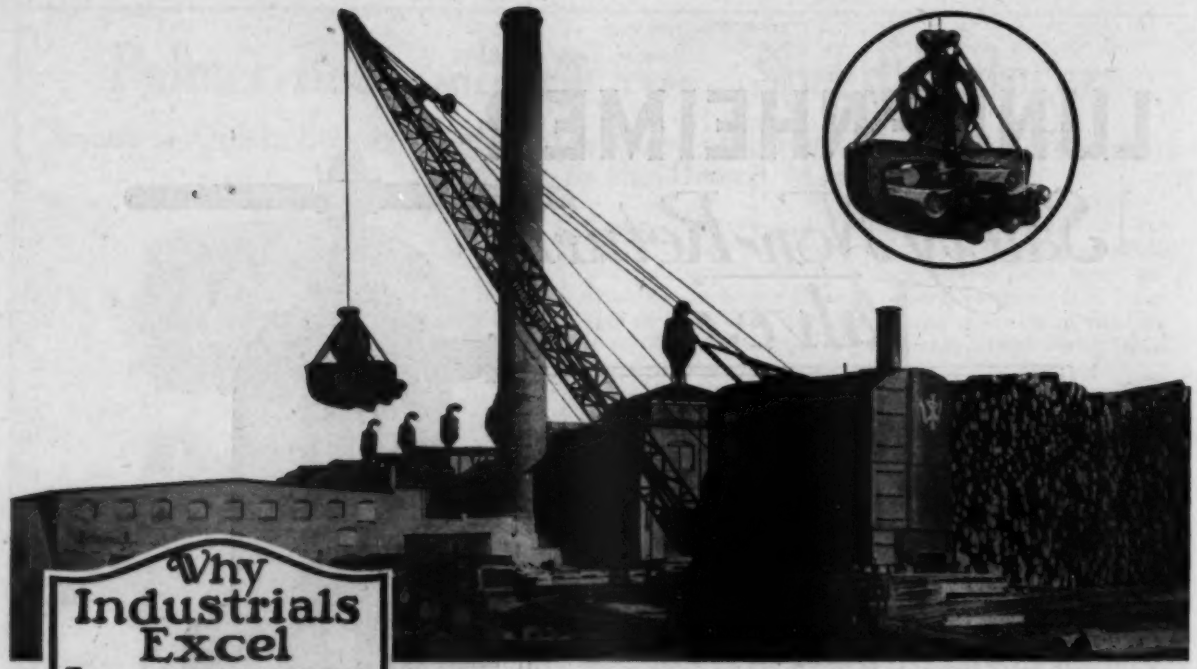
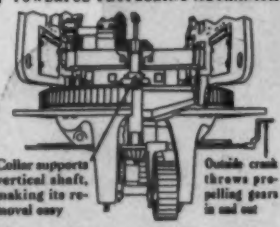


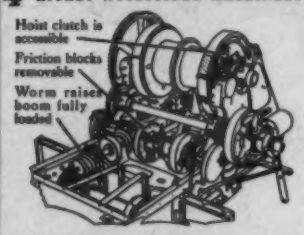
Why Industrials Excel

3 POWERFUL PROPELLING MECHANISM



Rail type locomotive supports all propelling mechanism on heavy legs cast integral with it. There are no bolted brackets or bearing caps to work loose, and none of the propelling mechanism is supported by the structural framework of the car.

4 HIGHLY ACCESSIBLE MACHINERY



Framework is of heavy castings bolted together with turned bolts. Bearings for all principal shafts are located on the outside of the side frames, where they are readily accessible. All important gears have cut teeth and all bearings are bronze bushed.

It's the operating speed that counts

AN INDUSTRIAL LOCOMOTIVE CRANE equipped with an INDUSTRIAL wood grapple will unload a trainload of pulpwood logs in an average of fifteen to twenty minutes per car. Equipped with a grab bucket it will unload 50-ton cars of coal in an average of twelve to eighteen minutes each. These records are not exceptional or for short-time operation. On the Canadian National at Hervey Jct., Quebec, a 15-ton INDUSTRIAL recently unloaded 102 cars of coal in 45 consecutive hours.

Hundreds of such performances are on record, showing that INDUSTRIALS are recognized as not only the best erecting and general lifting cranes, but as the fastest in bucket, grapple and magnet operation. This fast operation is due to properly related speeds, short-throw levers, ease of control and to the independent, double drums. These drums give automatic control of the opening line, allowing the bucket or grapple to be hoisted in open position without hoisting the boom, and eliminating clumsy operation.

You will be interested in our Golden Anniversary Catalog, which fully illustrates and describes the 17 types of INDUSTRIAL cranes from 5 to 200 tons capacity. It will be forwarded to you promptly upon request.

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Locomotive Cranes, 5 to 200 Tons—Transfer, Pillar & Gantry Cranes
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Portable Rail Saws—Grab Buckets—Magnets—Steam Pile Hammers

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THERE is often more difference in chain than is apparent on the surface. LOOKS are not always indicative of good service.

Performance, long life, reliable "trouble-free" service—that's good chain!

And GOOD chain is worth more than its cost—worth more than ordinary chain.

If you want reliable chain performance, buy your chain on the basis of service-per-dollar, rather than so-much-per-pound.

When you see chain, every link of which bears this mark >—< you know it is genuine Link-Belt. You can know, also, that it is backed by fifty years' experience in chain making—that it is GOOD chain.

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How the West Virginia Pulp & Paper Co. Solved Its Power Problem at Tyrone, Pa.

A 1250 Kw. KERR MIXED PRESSURE TURBINE and a 1250 Kw. Non-Condensing KERR TURBINE Provide Ideal Flexibility Between Electrical Demand and Bleeder Steam for Evaporating Purposes

Both machines drive 25 cycle alternators through KERR REDUCTION GEARS.

When both are in service they virtually become a 2,500 Kw. cross compound turbine under the control of the governor on the non-condensing machine which exhausts directly into the lower stages of the mixed pressure bleeder machine. The latter is entirely automatic in its operation.

The non-condensing turbine may also exhaust all of its steam into the heating lines.

If the non-condensing turbine is shut down, steam may be bled from the mixed pressure bleeder machine through the same opening in the casing as is used to admit exhaust steam.

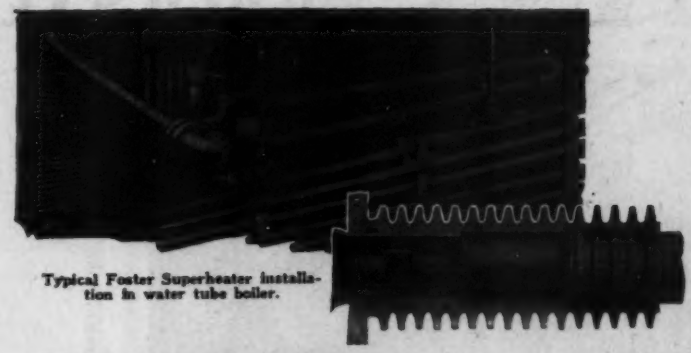
The greatest possible flexibility is therefore obtained. Since both machines are always under control of the governor the required electrical output may be maintained without regard to the demand for low pressure steam extracted from the turbine.

Kerr Bleeder Turbines will automatically maintain the desired heat balance in any plant that uses low pressure steam for heating or process work. Our engineering department will be glad to advise you. Write for full information.

KERR STEAM TURBINES-REDUCTION GEARS
KERR TURBINE COMPANY
WELLSVILLE, NEW YORK U·S·A·

DISTRICT OFFICES IN ALL PRINCIPAL CITIES

Reducing power costs in every industry



Typical Foster Superheater installation in water tube boiler.

How 10,000 plants have reduced fuel costs

FOR 20 years, Foster Superheaters have been helping power plant engineers to obtain better fuel economy records.

Over 10,000 plants have already found that Foster Superheaters increase boiler capacity from 10 to 15 per cent, improve turbine economy from 8 to 12 per cent, and improve engine economy from 10 to 30 per cent, depending on the type and size of equipment and degrees of superheat used.

Today, more than ever before, the records of these Foster installations are of significance to engineers and executives responsible for plants not yet deriving the benefits of superheat.

We are prepared to give you—without obligation—definite figures of the saving in your fuel costs that can be effected by Foster Superheaters. Just tell us your operating conditions and ask as well for the Foster Superheater Book describing the advantages of the special Foster construction.

POWER SPECIALTY COMPANY

Foster Superheaters and Economizers

111 Broadway, New York

Boston Philadelphia Pittsburgh Chicago San Francisco
Kansas City Detroit Dallas Boulder London, England
Plants at Dansville, N. Y., and Egham, England

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Some users of Foster Superheaters in the paper industry

Advance Bag & Paper Co.....Howland, Me.
Aroostook Pulp & Paper Co..Van Buren, Me.
Beaver Board Co.....Buffalo, N. Y.
Central Paper Co.....Muskegon, Mich.
Cheboygan Paper Co.....Cheboygan, Mich.
Clifton Paper Mills.....Passaic, N. J.
Crown Columbia Pulp & Paper Co.....Camas, Wash.
Crown Willamette Pulp & Paper Co.....Portland, Ore.
Crystal Tissue Paper Co.....Middleton, O.
Deerfield Pulp & Paper Co.....Mountain Mills, Vt.
Dill & Collins Co.....Phila., Pa.
Eagle Paper Co.....Joliet, Ill.
Escanaba Paper Co.....Escanaba, Mich.
Fitchburg Paper Co.....Fitchburg, Mass.
Fox Paper Co.....Lockland, O.
Hammermill Paper Co.....Erie, Pa.
Howland Pulp & Paper Co....Howland, Me.
Itasca Paper Co.....Grand Rapids, Minn.
Kalamazoo Paper Co.....Kalamazoo, Mich.
Keith Paper Co.....Turners Falls, Mass.
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Kingsport Pulp Co.....Kingsport, Tenn.
MacSim Bar Paper Co.....Otsego, Mich.
Marathon Paper Mills.....Rothschild, Wis.
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Port Huron Sulphite Paper Co.....Port Huron, Mich.
Rhinelander Paper Co....Rhinelander, Wis.
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United Paperboard Co.....Wabash, Ind.
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Why they use Foster Superheaters

1. A steel tube for strength; a cast iron shell for durability.
2. Four to six times more heat absorption surface as obtained from bare tubes.
3. Reserve heat stored for sudden demands.
4. Least space for desired superheating effect.
5. Steam stays close to hot tube surface.
6. Can be applied to any make or type of boiler.

FOSTER

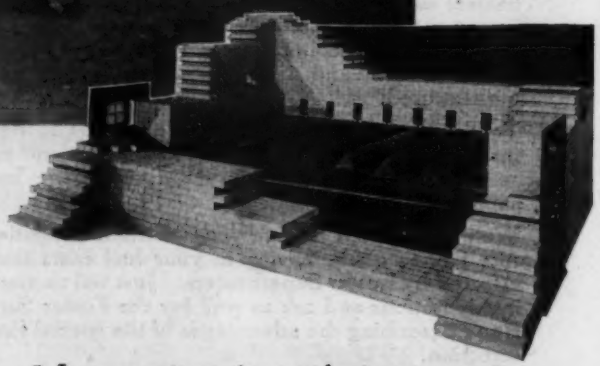
The SUPERHEATER

with the extended surface

More Detroit Multiple Retort Stokers for DURANT Motors Co.

H. G. Christman Co.
General Contractors
Lansing, Mich.

Johnson-Larsen Co.
Heating Contractors
Detroit, Mich.



Among the factors which influenced the Durant Motors Co. of Flint to increase their original order from three to six Detroit Multiple Retort Stokers, were:

1. The level fuel bed preventing avalanching, bridge wall clinkering difficulties and excessive loss of combustible in the ash.
2. The positive movement of fuel throughout the entire length of the retort.
3. The independent control of the feed of the fuel to each retort.
4. The fact that moving parts are all deeply buried in green fuel thereby reducing maintenance to a minimum.
5. Low power operating cost due in part to anti-friction roller bearings throughout the gear box.

Detroit Multiple Retort Stokers are in successful operation in all parts of the country. Let us tell you about these installations which contain many unusual features of interest to progressive engineers and executives.

Ask for Bulletin 142

DETROIT STOKER COMPANY

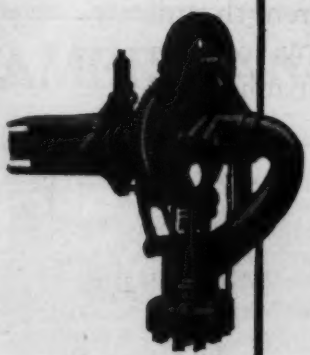
Underfeed Forced Draft and Overfeed Natural Draft Stokers

124 GENERAL MOTORS BUILDING DETROIT, MICHIGAN

DETROIT UNDERFEED TYPE U STOKERS

ASSURE CHEAPER MULTIPLE RETORT STEAM PRODUCTION

You'll *profit* by installing Diamond "Valv-in-Head" Soot Blowers



The superintendent of a large central station was showing his friend, the manager of a smaller station, through his plant.

FRIEND: "Now, about the soot blower question."

SUPERINTENDENT: "You will be interested in our experience. We installed Diamond Valv-in-Heads about a year ago and their use has saved enough coal to pretty nearly pay for their initial cost. Besides, we've gotten away from the expense of slagging entirely."

FRIEND: "What about operating costs?"

SUPERINTENDENT: "We've found Valv-in-Heads use only about half of the steam required by other type soot blowers, and it takes only one man to operate where two used to do the work. And while we are talking of operators, Diamond Valv-in-Heads are provided with reduction gearing that prevents the operator hustling through the motions of blowing. He can pull the chain just so fast and so the job is done right. And one more point, the Valv-in-Head does away with condensate, which means that maintenance costs are very small."

FRIEND: "Then you consider Diamonds a good investment?"

SUPERINTENDENT: "Would not be without 'em."

Write for Bulletin 297

Patent Notice! Soot Blowers having automatically operated valves were originated, developed and commercially introduced by us, and are covered by Patents issued and pending. Infringements of these patents will be prosecuted.

DIAMOND POWER SPECIALTY CORPORATION
Detroit-Michigan

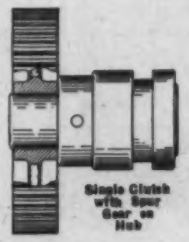
Diamond

Soot Blowers-Save 4 to 8% Fuel

THE JOHNSON FRICTION CLUTCH

as used on

The Langston Combined Paper Corrugating and Double Facing Machine



The Langston firm says: "The Clutch being small, is easily mounted—we find your Clutch extremely satisfactory for the purpose."

Single Clutch Broken Away

A No. 5 Johnson Single Clutch with gear mounted on hub is used on the machine shown below. It drives a trip cam on the traveling cut-off at the extreme left of the long machine This allows bad sections in the paper to pass through the machine and be cut out. Because of their strength and durability, and the small space which they occupy, Johnson Clutches are especially adapted for paper machinery..

Courtesy: Samuel M. Langston Co., Camden, N. J.

The reaction to Johnson Clutch service is nation-wide. Machine builders all over the country are adopting it. Almost every trade paper you pick up these days tells of still another new machine adopting the Johnson. You can lower your cost of producing by using the Johnson. Small and compact, yet strong and powerful, it is a thoroughly satisfactory clutch. Our engineers can solve all your clutch problems.

Write Today for Catalog P. I.

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN

WELLER EQUIPMENT

is designed
to meet the requirements
of the

PULP AND PAPER MILL

We maintain a competent engineering department and will gladly assist in the selection of equipment best adapted to the requirements.

Catalogues Describing Weller Equipment Will Be Sent on Receipt of Request

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Belt Conveyors
Chip Conveyors
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Bucket Elevators
Heavy Steel Chain
Combination Chain
Sprockets
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Friction Clutches
Heavy Bearings
Rope Drives
Gears
Coal Handling Equipment, Etc.

WELLER MFG. CO.

1820-1856 N. Kostner Ave. **CHICAGO, ILL.**

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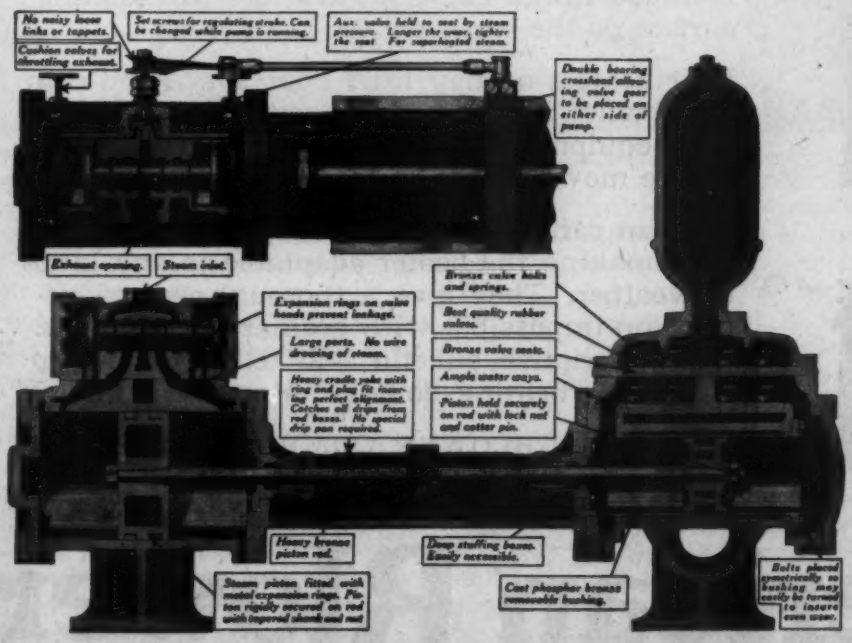
NEW YORK BOSTON BALTIMORE PITTSBURGH DETROIT OMAHA SALT LAKE CITY SAN FRANCISCO

AMERICAN-MARSH PAPER MILL PUMPS


No noisy loose links or tappets.
Set screws for regulating stroke. Can be changed while pump is running.
Aux. valve held to seat by steam pressure. Longer the wear, tighter the seat. For superheated steam.
Cushion valves for throttling exhaust.
Double bearing crosshead alloying valve gear to be placed on either side of pump.
Exhaust opening.
Steam inlet.
Bronze valve bolts and springs.
Expansion rings on valve heads prevent leakage.
Best quality rubber valves.
Large ports. No wire drawing of steam.
Bronze valve seats.
Heavy cradle yoke with ring and plug fit bearing perfect alignment. Catches all drips from rod boxes. No special drip pan required.
Ample water ways.
Piston held securely on rod with lock nut and cotter pin.
Heavy bronze piston rod.
Deep stuffing boxes. Easily accessible.
Steam piston fitted with metal expansion rings. Piston rigidly secured on rod with tapered shank and nut
Cast phosphor bronze removable bushing.
Bolts placed eccentrically so bushing may easily be turned to insure even wear.

The line includes:

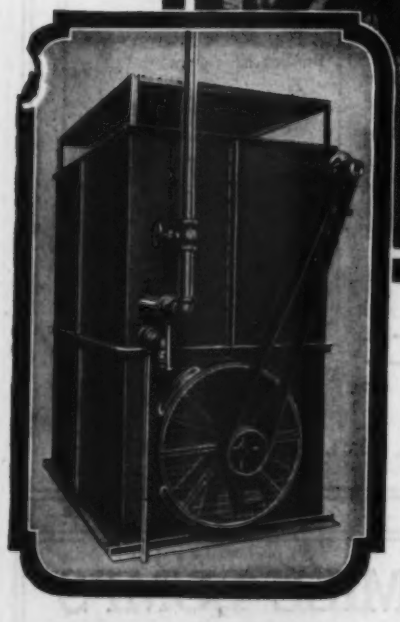
Centrifugal Stock Pumps
Wet Vacuum Pumps
Suction Box Pumps
Boiler Feed Pumps
Deep Well Pumps
Centrifugal Water Pumps

In fact pumps for every paper mill requirement.

160,000 pumps in successful operation.

Ask for catalog.

AMERICAN STEAM PUMP COMPANY, Battle Creek, Mich.



the heating efficiency of direct radiation

Forced circulation of air over steam coils causes them to deliver five or more times as much heat as they will when the air circulates naturally. Utilizing this principle, American Blower Unit Heaters make each square foot of radiating surface do the work of five.

Unit heaters occupy little floor space and can be installed in a few hours without disturbing other equipment. They are readily portable and can be moved about as needed.

The fan can be idle or run at varying speeds, thus making the heater adaptable to any kind of weather. They give a thoroughness of circulation impossible with ordinary steam coils. Our descriptive bulletin will tell you how to save your heating dollars. May we send it?

AMERICAN BLOWER COMPANY, DETROIT
BRANCH OFFICES IN ALL PRINCIPAL CITIES
CANADIAN SIROCCO COMPANY, LIMITED, WINDSOR, ONTARIO

One of many other types of American Blower Equipment for paper mill use—an installation for cooling calender rolls.

American Blower exhaust system for conveying paper trimmings.

American Blower

"Sirocco" VENTILATING, HEATING, AIR CONDITIONING, DRYING, MECHANICAL DRAFT
Manufacturers of all Types of Air-Handling Equipment ——— Since 1881

The Land of Timber and Turbines

By EDWIN E. SLOSSON*

SVANTE ARRHENIUS, the Swedish savant, is a prophet, like all true scientists. He not only describes "Worlds in the Making" but considers the unmaking of civilizations. He foresees a time when our fossil fuel will begin to fail and we shall have to seek other sources of mechanical energy. This date is not so far distant as we commonly assume, for oil fields and coal beds have already become the objects of international competition and even conflict. Many countries and three continents, Africa, Australia, and South America, are so inadequately supplied with coal that they could not keep up with modern progress except by the favor of more fortunate lands. And these lands are consuming their irreplaceable endowment with accelerating extravagance and sharing their coal supplies with other countries with surprising unselfishness — or short-sightedness. The power that has given little England dominion over a quarter of the land and the people of the world came from her coal fields, which she was the first to utilize in industry and commerce; but as Dr. Arrhenius says:

The Power Station at Trollhättan

"Glorious Great Britain will probably have consumed her reserves of fossil carbon in less than a hundred years. It would seem very natural that England should be tempted to promulgate a defensive decree restricting the excessive exportation of coal. But such a measure would provoke a new difficulty. The insular country could not satisfy the activity of her merchant marine if she were not allowed to ship her coal oversea. And without her merchant marine her superiority on the ocean would be compromised. So she prefers to continue the excessive exportation of coal."

The coal fields comprised in the old German Empire and now largely annexed or occupied by the victorious Allies are more abundant than the British and may be sufficient to last for a thousand years to come. After that time Dr. Arrhenius anticipates that England, Germany, and European Russia will mostly revert to the forests that covered them a thousand years ago, and civilization will again nestle about the summer shores of the Mediterranean.

But, as Dr. Arrhenius explained to me, when I visited him recently at his home in the Nobel Institute near Stockholm, the people of the Scandinavian peninsula may escape the fate that awaits the coal-fed countries of northern Europe, for they may utilize their water-power as a substitute for the energy that elsewhere is derived from combustion. Norway has a reserve of hydraulic energy amounting to about five horsepower per capita. Sweden may obtain 1.2 horse-power per capita from her waterfalls. No other country in Europe or North America is so well endowed with water power except Canada, which has three or four horsepower of possible hydraulic energy for each of her inhabitants, and little Iceland, which is said to have 22. The United States by using all her water-power could hardly give to each of her present population more than about half of one horsepower of mechanical energy.

Sweden, then, is in somewhat the situation that the United States or a similar country must come to when its stores of fossil fuel are exhausted. For Sweden has little coal and no oil and must rely mostly upon her forests and falls, her timber and turbines, for the energy that runs her industries and the heat that protects her population. So I set about to see what Sweden is doing in the way of making the most of her natural resources and keeping up with the

*Reprinted by permission from the October, 1923, issue of The American Scandinavian Review.

The Falls at Porjus

lands that are living on the wealth which they have inherited from the Carboniferous Era.

First, I went to Trollhättan, where the waters from Lake Vänern used to pour down through picturesque gorges in a series of foaming cataracts. But the trolls who formerly haunted these deep, dark, and dangerous depths have vanished, and in their place I saw thirteen silent turbines sitting in a row and turning as many dynamos. The turbine and the dynamo can do more work with less fuss than any other motive power I know of. The room was as cool, calm, and quiet as a church, yet here was being developed 170,000 horsepower. Imagine the scene if there had been actually 170,000 horses at work on treadmills, the dirt and stench, the neighing and tramping, the rattling and slipping, the kicking and whipping, the sweating and swearing! And in front of a marble-mounted switchboard that looked like the keyboard of a gigantic pipe-organ a man pulled down levers that set the electric cranes to lifting steel castings in the adjacent works, or lighted a distant farmhouse, or propelled the blue and white tram cars through the crooked streets of Göteborg, 45 miles away. The Trollhättan power plant is fed by Sweden's largest river, the Göta. The falls total 107 feet and when fully developed will provide about 425,000 horsepower.

From the Trollhättan plant processions of steel towers stride off across the country in all directions, like giants on stilts with heavy copper feed wires dangling from their shoulders by chains of porcelain plaques. Along the country roads one sees generally two lines of poles, one carrying the power current and the other the telephone wires. The Swedes use the telephone more than any other European people, and I think it safe to say that no other people make more common use of electrical power, at any rate in the rural districts. Between 30 and 40 per cent of the farming land in Sweden is now provided with power, and in some sections of Skåne 75 per cent of the farms are electrified. The farms have a prior claim over the factories for power.

In riding across Sweden from Göteborg to Stockholm by night I was surprised to see the incandescent lamps flashing from the windows of thatched cottages and forest huts. Some communities have passed directly from candles to tungsten wires, skipping the kerosene and gas stages in the history of illumination. But even more important than light

The Great Dam at Porjus, the most northerly power station in the world

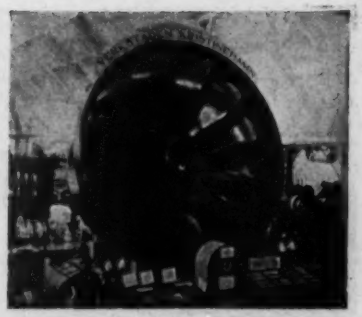
A turbine of ancient Sweden, reconstructed in a Smaland museum

The Sulphate Mill at Uddeholm

is the introduction of electrical power on the farm.

On some farms I saw women sitting on four-legged stools to milk the cows in the way of their ancestors. In other places the cows were being milked by electric motors and the milk drawn directly into tight tin cans where it cannot catch the dirt or absorb smells. Then it is put into a De Laval separator, the most famous of Swedish inventions. Churning is another chore of my boyhood days which the farmer's wife escapes by calling in the kilowatts. She may also heat her flatiron, run a sewing machine, or use a vacuum cleaner instead of a broom. Strangest of all was to find farmhouses surrounded by timber using electricity for heating and cooking.

For the outside farm work there are small portable motors, trundled about the place like a wheel-barrow, ready to be attached wherever needed. A ten horsepower motor of this sort costs 850 kronor. It is made as nearly fool-proof as possible. The switch is so arranged that it can be moved only by degrees so there is no danger of burning out the insulation by turning on the full force of the current suddenly. With such a motor the farmer can saw his wood, grind his feed, hoist his hay, turn his grindstone, and pump his water. Instead of waiting his turn for a threshing machine and then having to feed a lot of hungry threshers, he can set up his electric threshers when and where he likes and do his threshing by degrees.



A huge turbine manufactured at Kristinehamn, for Volkov, Russia

Sweden has now nearly a quarter of her water-power in harness, and plans have been made for the systematic development of the whole. The big water projects are in the hands of the government which is laying out trunk lines of high potential currents to cover the entire country and connect the various power stations so that they may supplement one another. When a lake in the south is at low level, the current may be supplied from some river in the north which is at its flood. In this way it is expected to eliminate steam power, which is still necessary in certain seasons.

The water-power of Sweden is largely in the northern part in Lapland, where the climate is most inclement and population scant. All the available water-power of central and southern Sweden will be

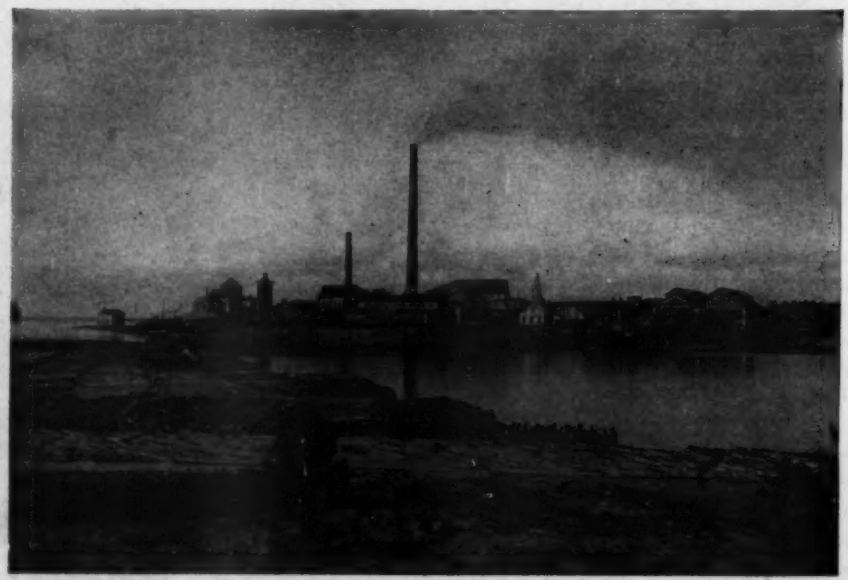
Rapids in Faxälfven

The wood of which pulp is made, Uddeholm

The Swedes seem to take naturally to turbines. One can see in the historical museum that they employed water-power for turning millstones in the days when elsewhere they were turned by woman-power. This was done by setting a row of wooden water wheels in a stream and attaching them to the upper millstones, one for each family. And these ancient water wheels were not of the overshot and undershot paddle form familiar to our New England towns, but were constructed on the true turbine principle.

The wheel is man's greatest improvement over the mechanics of nature. The unknown prehistoric inventor who made the first cart demonstrated thereby that the continuous rotation of a wheel was superior to the up-and-down motion of legs, and upon that principle subsequent machinery has mostly been constructed. The steam turbine has the same advantage over the reciprocating engine that the wheel has over legs and arms. When the steam engine came into use, it was of the reciprocating type where the piston moves back and forth in the cylinder and so works only half the time. Later the steam turbine was made practicable, largely through the efforts of Dr. Gustaf de Laval, and is now the motive power on the fastest steamers. In Sweden a steam turbine invented by Ljungström has recently been used on railroad locomotives.

set to work within the next ten years, and then the Swedes will look with speculative eyes toward the north. Here in the region which tourist literature always alludes to as "The Land of the Midnight Sun," without mentioning that it is equally "the land of the midday night," there lies in cold storage immense amounts of potential energy, capable of producing wealth if it can be made available. Lake Stora Lulejaure, which is within the Arctic Circle, is such a reservoir of power, and the river that flows from it falls at Porjus 190 feet with a flow ranging from 200 to 1,500 cubic meters per second. Here turbines have been installed by the state and furnish the power to run the railroad from the Norwegian frontier in the west to the Baltic in the east. In this region are the largest iron deposits of Sweden, and the energy of Porjus falls will be used for their electric furnaces and other chemical industries as well as for conveying their products to the coast. The intake tunnel, distribution reservoir, and discharge tunnels are excavated in solid rock so deep that the water never freezes even in the Arctic winter. Two miles below, the Stora Lule river plunges down a canyon in a succession of rapids called "Hare's Leap Falls," capable of developing 136,000 horsepower when set to turning turbines.



The Pulp Mills and Saw Mill at Uddeholm

But while the engine became speedier and more compact, the boiler remained much the same—big, cumbrous, wasteful, and incapable of supplying the high pressure steam that the turbine demanded. Steam of 300 pounds pressure or at most 400 has been considered the highest practical limit. The problem seems now to have been solved by a Swedish engineer, J. V. Blomquist, who has invented a boiler of unprecedented design, known as the Atmos boiler, which delivers steam under pressure of 1,500 pounds per square inch, or even more.

Two schemes for the more complete utilization of steam attracted my attention at the Göteborg Exposition. One was a combination of steam turbine with water turbine. The other was a steam accumulator, recently invented by Dr. Johannes Ruth, and prominently diplayed in the machinery building.

Yet what interests me in all this is not so much any particular contrivance, but the way all work together. For instance, the water from Lake Vänern turns the turbines at Trollhättan and these are connected directly with the dynamos. The current from these goes to the Vargöns paper mills where it is used in electrical boilers to produce steam, which is used in the pulp digesters and the paper machines.

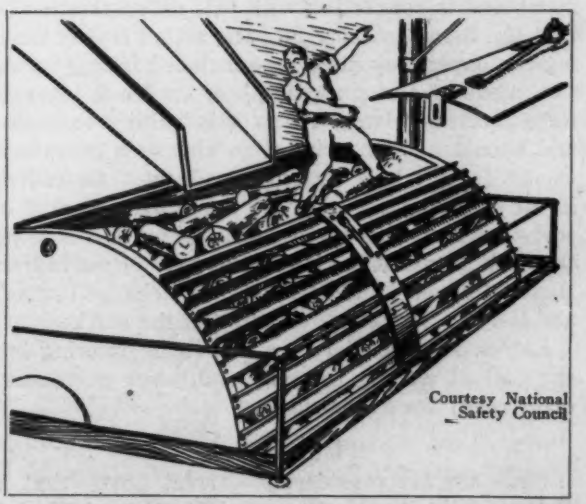
More than half of Sweden is covered by forests, and so carefully are these being replanted that although more than half the Swedish exports are wood products, the forest area is not diminishing but increasing. A part of the products exported are in the form of lumber or wooden goods, and part of the wood has been reduced to its fundamental substance, cellulose. This little country, the size of California, produces more wood pulp than any country in the world except the United States. Half the pulp that enters international trade is of Swedish origin, and a large and increasing part of this comes to the United States in form of pulp or paper. Since we have cut down our own trees without replacing them, we shall have to buy from those who have had more forethought, or else we shall have to go without our Sunday armful of reading matter. Swedish cellulose is also beginning to appear disguised as silk in the sweaters and stockings of our women and the ties and shirts of our men. Nearly half of what seems to be silk is nowadays produced in the factory. It comes from spruce trees instead of mulberry leaves and has passed through the hands of a chemist instead of through the body of a worm.

The wood pulp industry has made it possible to use smaller and younger timber than can be sawn into boards and beams and to utilize in some way the scraps and sawdust which formerly were burned. By the distillation of woody stuff and by the fermentation of the waste liquors of the cellulose factories may be manufactured a variety of valuable chemicals, such as the alcohols (methyl and ethyl and their bigger sisters), acetic acid and acetone. Ethyl alcohol may serve as a substitute for gasoline in motor cars or even replace grain alcohol in beverages, if people will persist in drinking it. The acetic acid may be used to dissolve cellulose in making artificial silk and enter into the dyes that color it. The acetone is used to dissolve the acetylene gas which feeds the automatic Aga beacons, according to the invention of Gustaf Dalén, the blind chemist who has illuminated the shipways of the world. The acetylene comes from calcium carbine which is made from lime and coal by the action of the electric current. This brings us back to the water-power with which we started, and shows that team play wins the game in modern industry as it does in sports.

The advantage of selling cellulose is that it is continuously and completely replenished. It is the same advantage that water-power has over coal. The iron ore that the Swedes ship out, 6,000,000 tons a year, is irrecoverable and however extensive the Swedish ore beds may be, they must ultimately be exhausted. But the cellulose that the Swedes ship out, 1,000,000 tons a year, comes back to them with the wind and the rain, along with the power that runs their machinery. For cellulose contains no elements but carbon, hydrogen, and oxygen, all of which are carried by the air in forms usable by the trees.

We may foresee a time to come, a time short in comparison with the history of the human race, when the free burning of oil, coal and wood will be prohibited by law on the ground that they are of more value for the material they contain than for the heat they can produce. In those days heat as well as power will be obtained from water-power and perhaps by solar engines; and vegetation, currently grown, will supply the carbon compounds necessary for food, clothing, building, and the like. The civilization of the future may depend upon timber and turbines for materials and energy necessary for life and industry.

What's the Other Fellow Doing?



Before you start this big bruiser be sure no one is in, on, or under it!

Correct Costs and Profits

BY THOMAS J. BURKE, C. A.
Secretary-Treasurer of the Cost Association of the Paper Industry

FOR approximately four years I have been in close touch with many pulp and paper mills throughout the country, and know that there is a wide-spread desire in the industry that the gospel of Correct Costs should be spread abroad. Although some groups in the industry have progressed further than others, there has been in every group a marked improvement over the conditions existing some years ago, when costs were very roughly estimated and not actually known until the end of the financial period.

We are advised by economists and statisticians that while we need not expect hard times, we must expect times of keen competition, and that from now on, for some years, there will be a period during which manufacturers must carefully consider all cost and expense items chargeable against their receipts. In other words—and present conditions seem to bear this out—there does not appear to be much possibility of increase in selling prices, while on the other hand, the cost of raw materials and the labor costs show a tendency to increase rather than decrease. Profit consists of the margin between the two, and manufacturers who wish to obtain an adequate return on their investment, must therefore concentrate on this narrow margin.

Correct Costs

Above reference has been made to Costs and Expenses; this differentiation is made to distinguish between those items which enter into the actual cost of making pulp or paper, and placing it ready for shipment at the mill door, and those items of expense which accrue after that time, until the paper is delivered to the buyer. The chief point to be remembered in connection with this differentiation is, that the items entering into the actual cost of making the paper may always be included in any valuation made of the stock of paper on hand, whereas items accruing later, are mostly selling expenses, and should not be included in any such inventory, except freight to a distant warehouse. Of course, in the event that an inventory is valued at market, or cost,—whichever is lower—and the market is lower than cost, some deduction will have to be made from these cost items, but that is a direct charge to profit and loss, on account of the drop in the market.

Let us now consider then, the items entering into the cost of placing the pulp and paper at the mill door, ready for shipment.

Purchases

Since we are considering Correct Costs, that is, the correct methods of ascertaining the actual costs and not considering matters appertaining to business policies, there is no reason for considering prices paid for raw materials other than the manner in which these prices are included in the costs. All materials as received, should be checked both as to weight and quality when received, a comparison being made with the purchasing order and the delivery slip. While they are not numerous, there are still some mills which do not make it a practice for instance, to weigh the pulp received, but accept the shipping weights as correct. While there may be some expense attached to weighing incoming raw materials, the fact remains that experience has shown repeatedly in the past, that this expense is so small as to be negligible and is really necessary if correct costs are to be obtained, apart from the fact, that in some cases large amounts have been saved through disclosures made by such a check. If incoming raw materials are all weighed, tested and stored in a safe place, a sound basis is laid for correct costs.

Requisitioning Raw Materials

This should be done on regular forms prepared for the purpose, and in such a manner, that each unit in storage is finished up before another unit is started. The storage of pulp deserves an article itself, and many such have been written, because of the large wastes and losses which have been incurred through dirt, etc. Raw materials should be handled as carefully as the money which purchased them. A loss of $100 in cash would cause a commotion; the loss of $1000 in raw materials oftimes passes unnoticed. Are you satisfied with the manner in which your raw materials are now being checked, stored and requisitioned?

Fixed Assets

The labor cost is made up of an amount which has to be paid at regular intervals. It comes before you repeatedly, so that you are constantly in touch with the amount of this cost. This is not so with the Fixed Asset Cost. In this case you paid out a large sum of money, perhaps many years ago, and very often, the fact that this sum of money, plus other sums, which you add to it yearly, is gradually dwindling away, is forgotten. This cost known as Depreciation is an important item, which as we know was often forgotten in the past, or deliberately overlooked, but is one which has come prominently before us in recent years, particularly with reference to calculations necessary in connection with the Federal Tax returns. How are you taking care of your Depreciation Cost? The correct method is roughly, as follows:

Segregate your fixed assets into divisions repre-

senting the different manufacturing processes, subdividing these divisions according to the kind of machinery and equipment used, which naturally depreciate quicker or slower, according to their make-up. An asset which depreciates quicker than another, naturally requires a higher depreciation rate. It dwindles away sooner and therefore will have to be replaced more often. When the fixed assets are thus segregated, it is a comparatively simple matter to ascertain the amount necessary to take care of the depreciation in any one particular process-center or department, which facilitates the ascertaining of the cost of each operation.

Another point to be considered, is the amount of space occupied by each department, which should be charged with this expense at an estimated amount, to cover the depreciation of the building and the cost of its upkeep or maintenance. This is an important matter, because it has often been found that there is a good deal of waste space, which should be either utilized for something else or shown up in the profit and loss account in its true colors, namely a loss due to unrequired building accommodation.

Taxes and Insurance

Federal Taxes are not a cost item. Profits must be ascertained before these are calculated. Local taxes are a proper charge against costs, and can be included in the amount charged for space against the various departments. The Fire Insurance cost should be similarly treated. Attention is drawn particularly, however, to the necessity for a very careful examination of all Fire Insurance policies carried. It has been my experience that insurance rates vary considerably in different mills, and while in many cases good reasons exist for these differences, still an examination of the fire insurance rates being paid by many mills, would bring out the fact that substantial savings might be made either by changing the company, or by making some improvements, which would be quickly paid for by the savings on the insurance premiums. Co-Insurance clauses particularly, should be carefulyy read, so that the exact position of the concern in its relation to the insurance company may be correctly understood.

Labor

The labor cost is generally classified as Direct and Indirect. Direct labor can be charged against some definite unit of production, while Indirect labor cannot be so applied. Indirect labor should always be included as a part of the departmental cost. It may sometimes be advisable on account of the nature of the operation or the method of wage payment, to make a separate charge to the product, covering the Direct labor cost as distinct from the departmental cost, but wherever it is possible, it is best to include the Direct labor also in the departmental cost.

The question as to how savings may be effected in the labor cost resolves itself into two sections:

1. The increase of productivity per man, by the offering of incentives in the shape of bonuses, etc., for increased production.

2. The elimination of unnecessary labor by a careful study of the different processes.

In this connection attention might be drawn to a study in Wage Adjustment, made by H. P. Carruth, General Manager of the Mead Pulp & Paper Co., Chillicothe, Ohio, which showed that there were six qualities which in greater or less measure affected all jobs. Of these six, four were in the nature of responsibilities, one, the training or experience required, and one, the working conditions surrounding the job. After several attempts, these were listed as follows:

1. Responsibility for supervision and training of others.
2. Responsibility for equipment.
3. Financial responsibility.
4. Responsibility for wastage.
5. Training or experience required.
6. Working conditions.

The idea of this study was to formulate rates based on the importance of the different jobs, according to the responsibilities they involved. Reports were then called for on each foreman and worker, and following these, a "stairway" of promotion possibilities was drawn up from roll tender to machine tender, and from yard man to assistant foreman, showing how a good workman could progress. The Mead Company have adopted a promotion-from-within policy, based on this "stairway". The point of interest in this to other executives, is that where such a system is possible, a large saving is effected through the reduction in the labor turnover.

In his article Mr. Carruth states that "In 1922 with an average number employed of less than 500, we were enabled through our promotion-from-within system, to make 172 promotions, and that in this same period out of some 240 men employed, only six men who could be classed as skilled workers were brought in from the outside, and those solely in the mechanical departments, where our opportunities for training are less complete than in the paper making departments."

It has been pointed out already, that in some districts such a plan could not be put into execution, owing to the large foreign element employed. It might, however, be partly adopted departmentally, possibly with good results, through its effect on the morale of the workers by encouraging them to fit themselves for the better jobs, and by the savings effected in the cost of training new men.

Power Costs

These costs have formed the subject of numerous articles which have recently appeared in various

trade journals, being the result of an investigation made by the Cost Association more than a year ago, into this important item of cost in pulp and paper mills.

There is no possible doubt that very large savings might be effected in this cost item in many mills.

The power plant should be considered as a separate department, and the total conversion cost per 1000 lbs. of steam delivered from and at 212° should be ascertained. It is important that the cost of the steam delivered should be ascertained, rather than the cost of coal used per ton of paper produced, as is sometimes done. If the cost of the steam is first ascertained, the distribution of this cost according to the steam used can be accomplished either by mechanical means or, where these are absent, by means of carefully calculated estimates. From information received, it would appear that it would well repay many mills to carefully investigate the conditions existing in their steam plants, with a view to ascertaining whether they might not considerably reduce their costs of operation by the installation of newer machinery.

Naturally the point to be considered is whether the cost of such installation would be met in a reasonable time by the savings effected in operating costs. One case has been quoted, where an installation costing over $40,000 was paid for in two years, in this manner.

Departmental Costs

The importance of providing an adequate analysis of departmental costs cannot be overestimated, and the accounting procedure should include such an analysis as a part of the regular routine. To accomplish this, each departmental burden account can be easily arranged, so as to show the expenditure for each class of charges, in direct comparison with budget estimates and previous results, thus eliminating the necessity for an analysis after the closing of the books. In addition to providing a complete analysis of departmental costs, this arrangement brings forcibly to the attention of the cost accountant, through the routine balance entries, any unusual differences between the estimates and the actual charges.

Such unusual differences should be immediately investigated to determine the cause. If a change in operating conditions has occurred, or expenses have increased, that fact is immediately presented, without waiting for personal checking of an expense by the management. Faulty conditions are instantly revealed and can be more quickly remedied, while warranted increases in manufacturing expenses can be promptly allowed for, in the cost of the product. Thus invaluable information becomes quickly available for the promotion of greater operating efficiency, and the departmental accounts periodically record the progress in each department.

Selling Expenses

Selling expenses are not a part of the manufacturing costs, and should never therefore be included in the inventory. Advertising may be included as a part of the selling expense, and, in some cases expenditures for advertising are properly treated as deferred charges over more than one fiscal period. These expenses may be included in selling price estimates, on the basis of pounds of perfect paper sold or its value.

Investigations made in different industries within the last year have shown that distribution expenses or selling expenses, were in many cases very heavy in proportion to the manufacturing costs. In view of the different methods employed by pulp and paper mills in disposing of their products, it is difficult to arrive at any average percentage of what this expense amounts to in the pulp and paper industry. In times of keen competition, there is undoubtedly a tendency to increase selling expenses in order to force sales. This is naturally a matter of administrative policy, which must be determined by each mill, but a note of warning might not be amiss in this respect. Is it not a fact, that in some cases instead of attempting to force sales by offering bigger inducements to salesmen or distributors or by increasing the advertising allowances, it would be better to spend some money in getting at the facts about the production costs, particularly where a number of products are being manufactured? Such an investigation may bring out the fact, that while money is being made on some products, losses are being made on others, and that therefore, if the non-profit items are eliminated, the required profits will be obtained without any increase in selling expenses.

Profits

In the above article, several quotations have been taken from our publication, A Budget Cost System for Paper Mills, which also includes the following about profits:

The astounding percentage of business failures eloquently teaches the necessity for establishing selling prices which cover not only the complete cost of doing business, but which also include sufficient gain to enable the business to perpetuate itself. Manufacturing enterprises can be permanently successful only when the element of gain is given careful consideration before selling prices are established.

Many unwisely consider that it is necessary to take into account only an amount sufficient to cover the current dividend payments. This may furnish a reasonable return to the stockholders when manufacturing conditions and sales are at their best, but it is courting disaster to assume that maximum production and sales will continue indefinitely.

Quotations should therefore include an amount of gain sufficient to insure returns which will be large

enough to assist in payment of dividends during periods of business depression.

In addition to the payment of dividends, the estimated necessary gain should include an amount sufficient to provide not only for various contingencies but also for a consistent development of the business. This is a fundamental economic principle upon which the permanent success of any industry must be based. This principle has been too long overlooked by some to the detriment of the entire paper industry, but progressive manufacturers today realize its importance and others must, if they are to survive the great economic readjustment of the present chaotic world conditions and attain future success.

The adoption of a uniform method by all mills for calculating a legitimate gain as outlined above which should be added to the cost when determining a selling price, is of only slightly less importance than the adoption of uniform cost methods. A paper mill being a manufacturing plant, the gain included in the selling price should be based upon the manufacturing operations. As the principle manufacturing operation in a paper mill is the conversion process, the paper machine productive hour offers an ideal uniform basis for establishing a rate per hour for gain.

It must be remembered that the actual trading loss and gain and the Legitimate Gain mentioned above are two distinct subjects. Competition and market conditions may result in a larger or smaller profit on an order than the hour rate of gain would indicate, but this rate gives a sound basis upon which to make quotations.

The Cost Association is working in an effort to encourage, and assist in, the installation of accounting systems in all pulp and paper mills, which will develop Correct Costs, and thereby assist executives in eliminating waste, and thus increasing profits.

Great progress has been made, but a great deal still remains to be done. Progress has been slow in every industry in which this work has been undertaken, and it is only with the co-operation of the executives and their accountants that the industry can be placed on a sound economic basis, through the development of proper cost estimating and cost finding systems, which will give the real facts and eliminate the poor estimates or rather guesses, which unfortunately are only too common in the industry. We ask your co-operation in this work.

Sulphite Waste Liquor

CH. HARNIST

(Translated from *Science et Industrie* vii, No. 108, pages 65-70 by A. Papineau-Couture)

THE utilization of waste liquors from the manufacture of sulphite pulp is one of the most important problems facing modern industries. Up to 1919, about 350 scientists and investigators had published articles on the subject, and several hundred patents had been taken out. This work was started owing to the necessity of finding some method of disposing of these liquors without causing stream pollution, which had caused the raising of such vigorous protests that in some cases mills were forced to shut down and move elsewhere. It is therefore quite natural that the manufacturers should have offered prizes for the best solution of the problem; and in Germany, a short time before the great war, the pulp manufacturers offered a prize of 100,000 gold marks for the best method of disposing of sulphite waste liquor or of utilizing it profitably and thus reducing the cost of production of sulphite pulp.

But recent researches by Swedish, Austrian and German chemists, the most important of which are those of Dr. Peter Klason, Director of the Institute of Forestry at Stockholm, have revealed that the importance and scope of the problem are much greater than its mere application to the pulp industry: it possesses a great scientific interest, and it is capable of upsetting and transforming completely the production of fine chemicals at present derived from coal tar.

Sulphite waste liquor is at present what coal tar originally was, namely, a troublesome waste product which is best disposed of by throwing it away. But whereas the tar constituted only a small fraction of the coal distilled, the amount of organic compounds contained in sulphite waste liquor is equal to the amount of pulp produced. Before the war there was destroyed about 2,000 tons of these organic compounds daily in Germany, nearly 3,000 tons in Scandinavia, and about 1,000 tons in Canada. The amount lost in Germany alone thus amounted to nearly as much as the combined production of coal tar from coke ovens and from the gas works.

These few figures give a very good idea of the importance of the problem: but what is more difficult to understand is why the problem of the disposal of coal tar was solved so rapidly, while up to the present only an insignificant portion of the pulp liquors have been used.

The reason is to be found in the fact that the usual methods used for the separation of organic compounds, fractional distillation and fractional crystallization, are useless in this instance: the compounds which are found in the liquor do not crystallize and they are destroyed by distillation.

So far it has been impossible to determine definitely and exactly the composition of these compounds. According to Klason, the organic matter of spruce has approximately the following composition:

Cellulose	50 per cent
Lignin	30 per cent
Carbohydrates	16 per cent
Resins and Fats	3.3 per cent
Proteins	0.7 per cent

But the exact constitution of none of these bodies is known, not even that of cellulose which has been studied the most. At first, all the organic non-cellulosic matter of the wood was called lignin, and a composition approximating to that of resin was as-

signed to it. Later, it was found out that this so-called lignin contained fats, resins, proteins, and gums. These gums consist of pentosans and hexosans, carbohydrates which, on hydrolysis, yield pentoses and hexoses; and among the latter glucose, mannose and galactose have been isolated. But there still remains about 60 per cent of the incrustants, which we call lignin, and the constitution of which remains unknown.

Action of Sulphite Liquor on Wood

Let us examine the action of sulphurous acid and of calcium bisulphite on the various constituents of the wood.

Cellulose is unaffected, or practically so. The carbohydrates are for the most part hydrolyzed. The resins are not attacked, but nevertheless they go into colloidal solution in the liquor, together with the fats, and collect at the surface of the liquor; and part is removed in the form of cymene when the digester is relieved. The lignin is rendered soluble and dissolved out, and, according to Klason, each molecule of lignin fixes three molecules of sulphurous acid. One of the latter is only loosely combined, and is easily separated, e. g., by neutralizing and heating; another molecule of sulphurous acid, on the other hand, is combined with the lignin in such a stable manner that it can only be removed by a very drastic treatment, such as fusion with caustic alkali. It is on account of this stability that the soluble lignin compounds formed during cooking have been called ligninsulphonic acid, by analogy with the sulphonic derivatives of coal tar, which behave similarly. The proteins are also dissolved by the liquor.

Composition of Sulphite Waste Liquor

Consequently, for every ton of sulphite pulp produced the waste liquor contains:

Lignin (as lignosulphonates)	600 kilos
Carbohydrates	325 kilos
Resins and Fats	30 kilos
Proteins	15 kilos
Sulphurous Acid (in combination with the lignin)	200 kilos
Lime	90 kilos
Total	1,260 kilos

There is approximately 10 cubic meters of liquor per ton of pulp, so that it contains about 10 per cent of organic matter, besides lime and sulphurous acid. If the material has been cooked very hard the liquor will contain more solids and will be dark brown; while it will be lighter in color, going almost to a yellow, when the cooking has been mild.

On evaporation it yields a pitchy mass which is difficult to dry. By means of Kestner evaporators a pulverulent product can be obtained; but it is very hygroscopic. Anybody who has seen this "sulphite pitch," as it is frequently called, readily understands the difficulties encountered in attempting to make use of the liquor.

Part of the lignin-sulphonic acid, however, can be precipitated by means of alcohol or of salts (sodium chloride, sodium sulphate, etc.), and Klason has succeeded in precipitating the whole of it by means of naphthylamine. In his opinion the constitution of lignin (which has a very high molecular weight) is closely related to that of the tannins; and he has even put forward a constitutional formula by which he represents lignin as elaborated from a mixture of derivatives of pyrogallic acid. But of course this formula is only hypothetical. It furnishes a plausible explanation of the mechanism of sulphite cooking, but he has not been able to adduce any real proof of the proposed constitution. All chemists, however, are agreed that lignin belongs to the so-called aromatic group of compounds, because its decomposition products are aromatic derivatives (pyrocatechol, protocatechuic acid, phenols).

It is true that the maximum yield of these decomposition products which has been obtained so far (by Prof. Klason) is only 15 per cent; but it must be remembered that the methods used so far are too drastic, and it has not yet been found possible to prevent destruction of these highly complex organic compounds, which are unstable as compared with the constituents of coal tar.

Relation Between Lignin and Coal Tar

Fr. Fischer, director of the Institut für Kohlenforschung at Mulheim, has adopted Klason's theories in order to establish his own theory of the origin of coal tar, which he attributes to the lignin compounds of the coal. For the lignin is more resistant to decomposition than the cellulose, the latter being fairly rapidly destroyed by the action of microbes on the wood.

All this work has brought the investigation of the constitution of lignin to a very interesting stage. According to Fischer the lignin compounds in coal already contain the various aromatic radicles which are present in coal tar, and which form the starting point or raw material in the production of synthetic organic chemicals. In this industry various explosives, pharmaceutical compounds and dyes are prepared by introducing side chains into the existing nuclei, which is obtained by means of relatively drastic reactions. But the lignin already contained these side chains or groups, which were destroyed during the distillation of the coal, leaving only a small number of nuclei which are stable at high temperatures.

Instead of breaking down the lignin molecule and then building it up again, would it not be more rational to use it directly? Or else to modify its composition by means of delicate reactions such as occur in Nature to obtain the products elaborated in Nature's wonderful laboratories, such as the coloring matters of madder and other plants, alkaloids, perfumes and a host of other substances, of which but very few have as yet been synthesized from coal tar derivatives? The secret of these processes will doubtless be found within the realm of vegetable biology, where we shall eventually discover the method of using light, bacterial action, ferments and catalysts to accomplish those wonderful syntheses compared to which our present day processes will look crude.

Sooner or later, when coal supplies are exhausted, we shall be forced to resort to these methods; and it is especially in the interests of countries completely lacking in coal resources, like Scandinavia, or of those who have but an insufficient supply, like France, to direct their attention right now to living organisms, the supply of which is continually being renewed. There is here a vast field in organic chemistry to explore, which has been merely scratched by the remarkable work of Prof. Willstatter, of Zurich, on chlorophyll and the coloring matters of flowers.

Among the products of the soil, from the present standpoint, by far the most important are the trees. These should no longer be burnt, as we are still doing

on such a large scale, but should be subjected to selective cultivation so as to improve the species and increase the yield and qualities of cellulose and other valuable by-products. And in the same way as, in the organic chemical industry, coal tar has come to be the main product and coke the by-product, so chemical pulp may become a by-product of the preparation of lignin derivatives once we have found out how to use them.

In the waste liquor the lignin is found in the form of lignin-sulphonic acid, having been but slightly changed in the sulphite cooking process, which process could not be applied to coal. It exists in great abundance in wood, and could very easily supply all requirements for organic substances. Nature appeals to our common sense not to wantonly destroy the results of the work so carefully elaborated by her, but to go to work ourselves to find more rational and advantageous methods of continuing this work and deriving the greatest benefits from it.

What Has Been Done So Far

In order to see how we should set about and what remains to be done, we shall first review what has already been done to date.

We have already pointed out that the organic matter dissolved in the liquor is not amenable to any simple method of treatment, at least as far as known processes are concerned. Consequently, all kinds of strange (not to say desperate) expedients have been resorted to in endeavors to utilize this material profitably. A sanatorium at Frankenhausen installed equipment for the inhalation of sulphite waste liquor fumes as a treatment against tuberculosis. The liquor has also been recommended as a remedy against foot and mouth disease in cattle, for preserving eggs, for washing clothes, and even for getting rid of vermin.

In order to see our way clear through the maze of suggestions and patents of all kinds, we shall classify them according to the proposed uses of the products obtained. We shall first of all consider the recovery of the inorganic constituents (sulphur); after which we shall take up the production of fuel, both liquid (alcohol) and solid, products based on the binding and adhesive properties of the liquors (binders for pulverulent material, paper size), and production of tanning materials, coloring matters, feeds and fertilizers.

A.—Sulphur

A considerable proportion (about one-third) of the sulphur is recovered during cooking by relieving the digester; and in some modern mills a further amount is recovered by discharging the cook under pressure into a completely closed blow-pit, from the top of which the vapors and fumes are drawn off and condensed.[1] It should be noted, however, that the digester relief contains cymene, which on cooling and letting stand separates and rises to the surface of the liquor.

The most practical process for recovering the remainder of the sulphur is that of Frank,[2] who adds lime to the liquor to precipitate the sulphur as calcium monosulphite ($CaSO_3$), which is removed and transformed into soluble bisulphite ($CaH_2(SO_3)_2$) by treatment with sulphur dioxide gas.

Dorefeldt has proposed treating sulphite waste liquor in a manner similar to black liquor from alkaline pulping processes, namely, evaporating and calcining. But the sulphite liquor contains less of the active chemicals and furthermore they are of less value than in the case of the black liquors, so that such a treatment would not be a paying proposition. The Frank process, which is more practical and much cheaper, is not even used; and even in those cases where it has been adopted for entirely different reasons—which we shall look into presently—such difficulties were encountered in the transformation of the calcium monosulphite into the bisulphite, that all idea of recovering the mineral constituents of the waste liquor was finally abandoned.

B.—Alcohol

The manufacture of alcohol is the only method of utilizing sulphite waste liquor which is carried out to any considerable extent.

We have already seen that the sugars present in the liquor are formed by hydrolysis of the 16 per cent of pentosans and hexosans of the wood, and not by hydrolysis of the cellulose, as had been thought at first, sulphurous acid having practically no action on cellulose under the conditions of concentration, temperature and time of cooking prevailing in the sulphite process.

Mitscherlich,[3] who introduced the sulphite process in Europe, observed the presence of sugars in the liquor and tried to obtain alcohol from them; but this was not economically feasible owing to the small amount of fermentable sugars and the enormous volume of liquid which had to be treated. Other experiments were undertaken in Germany with a view to eliminating the fermentable sugars from the liquor before discharging it into streams, because their fermentation was considered injurious to fish life; but these also were abandoned.

It is only modern improvements in distilling apparatus combined with favorable excise conditions such as occur in Sweden that enabled Wallin and Ekstrom and the Ethyl Company to manufacture sulphite alcohol commercially. The first plant was built in 1911 at the Bergvik pulp mill, but it was only after many unexpected difficulties had been overcome by Hagglund that it could be operated efficiently and economically.

The hot liquor from the digesters passes through a small wooden aerating tower, where air is blown through it to cool it down slightly, remove the volatile compounds, and supply the oxygen required for the growth of the yeast. Sulphurous acid, which is injurious to the yeast, is removed by a modified Frank process in large wooden or concrete tanks of 100 cubic meters capacity, 300 kilos of freshly slaked lime being first added, and then sufficient finely pulverized limestone to complete the neutralization, which takes from four to five hours. At the same time air is injected at the bottom to agitate the liquor. When neutralization is complete the precipitate is allowed to settle, and the clear liquor is decanted into large concrete fermentation tanks equipped with cold water coils to regulate the temperature, which should be maintained at about 30° C. A certain amount of calcium phosphate, ammonium sulphate and yeast extract are added as yeast food, The fermentation takes about three to four days.

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[1] Achenbach process—German patents 252,412 and 286,601—also G. A. Richter, U. S. Patent 1,469,959, Oct. 9, 1923.

[2] Frank—English patent 13,286 (1886); Drewsen—German patent 67,899.

[3] German patent 82,498.

Distillation is carried out in Guillaume columns, which are 15 to 20 meters high and which yield a product containing but slight amounts of impurities, as the latter are separated from the alcohol during the distillation in the Guillaume system. The impurities consist of 1 to 3 per cent of methanol (wood alcohol), 0.5 to 1 per cent of aldehyde, some higher alcohols (propyl, amyl and butyl alcohols) and a trace of borneol. The cost of installing an alcohol plant to handle the liquor from a 30 to 35 ton mill was about 250,000 francs ($50,000) before the war, and about 500,000 francs ($100,000) for a 10 ton mill; and the cost of production of the alcohol was 0.272 franc per liter (about $0.20 per gallon), including overhead, depreciation, and interest charges.

The yield is 40 to 45 liters of alcohol per ton of pulp (the fermented liquor contains only about 1 per cent of alcohol), and it could be doubled if the liquor held by the pulp in the digester could also be used.

During the war the Swedish and German manufacturers installed, with the help of government subsidies, the Ethyl Company's process in all the large pulp mills. Such a plant could turn out about 30 to 40 hectoliters a day, and the total capacity of the German plants is about 100,000 to 120,000 hectoliters a year.

The cost of production could be reduced by a preliminary concentration of the liquor, provided the cost of concentration could be covered by the utilization of the remainder of the 10 per cent or organic solids which it contains, for at present only 1 per cent (which is only the tenth part of the solids) is recovered as alcohol.

C.—Solid Fuel

One way of using the residues from the manufacture of sulphite alcohol would be to use them as fuel. This could be readily accomplished by evaporating the liquor to dryness; but this evaporation is both difficult and expensive, as in the case of the production of alcohol and for the same reasons, namely, the presence of sulphurous acid and the dilution of the liquor.

Attempts have been made to turn the difficulty, and the Swedish engineer, Strehlenert, devised a most ingenious method of doing it.

Tavernier and Oulman[4] had already found that heating the liquor with sulphuric (or hydrochloric) acid caused a precipitation of the greater portion of the organic solids in a gelatinous form. Strehlenert makes use of this reaction; but instead of adding sulphuric acid he forms it from the sulphurous acid of the liquor by means of Berthelot's reaction: $3SO_2 = 2SO_3 + S$. He heats the liquor under a high pressure, which reduces the amount of sulphuric acid required, transforms the sulphurous into sulphuric acid, and accelerates the precipitation of the organic matter.

The Strehlenert[5] patents have been bought by the A. S. Sulfitkul of Christiania; but it is now admitted that the process is too expensive as compared with present prices of coal, on account of the high steam consumption required to obtain the reaction temperature of 190° to 200° C. which must be used, and also on account of the cost of the autoclaves which must withstand a pressure of 15 to 20 kilos (about 200 to 275 pounds per square inch) and are therefore relatively small.

[4]French patent 359,239.

[5]Norwegian patents 24,140 and 27,637.

Attempts have been made to convert the intermittent Strehlenert[6] process into a continuous one, with partial recovery of the heat; but it has not yet got beyond the experimental stages. Precipitation is not complete, about 30 per cent of the organic matter remaining in solution. With concentrated liquors the precipitation is almost quanitative.

"Sulphite coal" contains sulphur and calcium sulphate, and is black like coal, but it differs from the latter in composition.

Another process is competing with the Strehlenert process in Scandinavia. This is a true evaporation process; but most of the coal required in the ordinary evaporating process is replaced by electric power by making use of the following principle:

The vapor generated by heating the liquid to be concentrated is compressed, which compression generates heat whereby the temperature of the compressed vapor is raised sufficiently to enable it to heat and evaporate the liquid from which it was generated. The Swiss firm of Kummler, Matter & Co. has succeeded in applying this principle to the evaporation of sulphite waste liquor. This involved overcoming the difficulties due to the presence of sulphurous acid, and more particularly of the loosely combined molecule of this acid, which we mentioned in the early part of this article, and which is freed from its combination with the lignin during the evaporation. The fact that the largest pulp mill in Norway has adopted this process certainly speaks well for it.

The use of this fuel has become interesting since the war, as the enormous increase in the cost of coal can compensate the cost of evaporation or of treatment. And yet its use has not spread to any extent so far.

Raschig[7] proposes mixing dry solids from sulphite waste liquor, instead of charcoal, with ammonium nitrate to obtain a safety explosive. And similarly Wegelin[8] puts forth the idea of obtaining explosives by mixing the carbonized solids with liquid air.

Considerable attention is being given to the use of activated charcoal instead of bone black as a decolorizing agent, and especially for the absorption of volatile vapors (alcohol, ether, sulphurous acid, etc.) contained in air or in other gases, and sulphite waste liquor has been proposed as a raw material for the preparation of the activated charcoal.[9]

D.—Binders, Adhesives and Paper Size

After covering the uses which destroy the complicated structure of the lignin, we shall now turn our attention to the constructive uses, which will reach their full development when means have been found of making this material the starting point in the manufacture of dyes and in other organic syntheses.

The first step in this direction is the briquetting of fuels, such as coal dust, coke, peat, etc., by means of sulphite waste liquor.

But there soon developed a very serious drawback: the briquettes disintegrated when exposed to rain, owing to the solubility of the binder. For the same reason, the use of liquor for sprinkling roads to hold down the dust has not been as successful as had been expected, even when it was emulsified with mineral oil to reduce its solubility.

On the other hand, when the briquettes are used

[6]German patent 341,857.

[7]French patent 447,419.

[8]French patent 478,819.

[9]Knopfmacher English patent 102,608; Zellstofffabrik Waldhof German patent 309,155.

immediately, for instance, in blast furnaces (coke dust, ore fines), this use as a combined binder and fuel is quite successful. Another use which has proved quite practical, and which is the only one practiced in France to our knowledge, is that of core-binder in iron foundries.

The Walsum pulp mill in Germany sold a cellulose pitch ("Zellpech") which was used mainly for briquetting dust for use in blast furnaces. Evaporation was carried out with Kestner evaporators.

For all of the above uses the liquor must first be neutralized.

The principal investigators who have published articles on the subject or taken out patents in connection with it are: Ullmann,[10] Mitscherlich,[11] Trainer,[12] Gewerkschaft Eduard,[13] producers of Zellpech, Tavernier and Oulmann, Polaczek, etc.

During the war the Germans used the liquor as an "Ersatz" for gum arabic.

The adhesive properties of sulphite waste liquor are due to the presence of colloidal organic substances (ligninsulphonic acid, resins) which are the very ones which render the investigation of the liquor so difficult. The laws governing the behavior of colloids, which have been discovered in the last few years, are fully made use of in the various patents: precipitation by use of electrolytes or of colloids of different sign, separation of colloids by osmosis, etc. We shall deal with the osmotic treatment under the next heading.

Two commercial products have been obtained by precipitation with other colloids, the "gela-lignosin" and "albu-lignosin" of Cross and Bevan[14], obtained with gelatin and albumin, respectively. They were to be used as mordants and as paper size. The latter use is particularly attractive for pulp mills; and Mitscherlich, who introduced the sulphite process into Europe and whose name is associated with many of the proposed methods of utilizing sulphite waste liquor, devoted special attention to this one. He finally succeeded in producing a paper size which is to this day used in his mill at Hof, Germany. But only a very small fraction of sulphite waste liquor is used in this manner, and the rights to his numerous patents, the chief of which are English patents 12,566 (1884) and German patents 82,489, 220,066 and 235,965, have not been acquired by other mills. His size is obtained by adding a solution of horn in soda to the liquor and precipitating by means of hydrochloric acid; the precipitate was dissolved in borax, emulsified with rosin and precipitated by means of alum or common salt.

Another product of the precipitation of the colloids of the liquor is Ekman's "dextrone",[15] which is similar to the lignosins. The neutralized and concentrated liquor is treated with common salt, sodium sulphate, magnesium sulphate, etc., to precipitate the colloids. Seidel's "lignoresin"[16] is obtained in very much the same way.

The products obtained by precipitation with an electrolyte have been studied by Klason, Melander, König and Fuchs. They have been recommended for use as mordants rather than as paper size, and we shall deal with them under the heading "Dyes and Coloring Matters."

E.—Tanning Materials

Osmosis was investigated by Mitscherlich. His intention was to keep the colloids on one side of the diaphragm with a view to using them for tanning. And in his German patent 4,179 for the production of sulphite pulp, the latter was really considered as a by-product of the manufacture of a fermentable, adhesive and tanning extract (from oak), which was the main product.

The tanning properties of sulphite waste liquor have been contested quite frequently, and it was claimed to act only as a filler; but recent investigations by König and Fuchs have shown the presence of a tannic acid of the catechol group.

Good results have been obtained in the following manner:

It was known that quebracho extract, which contains difficult soluble phlobaphenes, could be rendered more efficient by suitable treatment with sulphurous acid or sulphites which render the phlobaphenes soluble (Gansser process). By adding waste liquor instead of a sulphite to the extract, the phlobaphenes are dissolved, and at the same time the tanning properties of the liquor also come into play. But it is claimed that when it has been well prepared sulphite waste liquor alone gives better results than oak or hemlock. The most important requirements for this are freedom from lime and from iron. After removing the sulphurous acid by means of lime, the latter must be precipitated out with oxalic or sulphuric acid; but if lactic acid is added to the liquor the excess of lime need not be removed, as calcium lactate does not interfere with the tanning. The lime can also be eliminated by treating the liquor with a cyanide or with calcium cyanamide, and then precipitating the organic cyanide with an acid.

These products are marketed under various names, such as, Fichtenholz-Extract, Cellulose Extract, Sulphite Extract, Excelsior, Norego (Norway). They seem to be fairly widely used in America.

Kempe,[17] Hoenig,[18] and especially Kumpfmiller[19] are amongst the most important investigators who studied the problem.

F.—Dyes and Coloring Matters

Lignosins, lignoresins, and dextrones, which we described above, have been proposed as wool mordants instead of lactic or tartaric acids for the reduction of potassium bichromate. Lignoresin is still manufactured in Austria.

Corss and Bevan also recommend the use of their lignosin as a thickener for printing compositions, and as a base on which to precipitate color lakes.

An Austrian company wants to reduce vat colors, and especially indigo, by means of sulphite waste liquor;[20] while the Badische Aniline uses the colloids of sulphite waste liquor to precipitate the reduced indigo in a colloidal condition.[21]

The first experiments on the manufacture of dyes were carried out by the Oesterreichische Sodafabrik, which obtained a blackish-brown sulphur dye by fusion with sodium sulphide and sulphur. The most interesting work was that of Phelps, who treated the

[10] Austrian patent 3,043.
[11] German patents 72,161 and 72,362.
[12] Most recent patent German patent 161,675.
[13] French patents 359,239 and 412,153.
[14] English patent 1,548 of 1883.
[15] English patent 20,036 of 1893.
[16] English patent 19,005 of 1897.
[17] Swedish patent 8,422.
[18] French patent 413,849.
[19] U. S. patent 940,394.
[20] German patent 104,359.
[21] German patent 221,191.

liquor with aromatic amines: primary colored amines gave red products, and secondary amines gave brown or black products. Attempts to produce dyes from these by treatment with nitrous acid (diazotization) were unsuccessful; but, on the other hand, treatment with nitric acid have true dyes. Phelps did not succeed in isolating them in a state of purity, however, since the condensation products with amines broke down when he tried to isolate them.

Oemann tried to go around the difficulty by using the colloids precipitated by means of common salt instead of using the liquor directly. The dyes which he obtained were not pure, nor did different samples of waste liquor give products having a constant composition; and so they could not be used for dyeing. Oemann considered that this reaction of ligninsulphonic acid furnished a definite proof of its aromatic constitution (phenol), since phenols give this reaction; but Klason showed that this proof was not sound.

The use of sulphite waste liquor for the preparation of dyes and pharmaceutical products would certainly be the most profitable, if it could be carried out commercially.

G.—Cattle Feeds

After fuel, this is certainly the use which could absorb the largest quantities of liquor; and it would be much more advantageous than ordinary combustion, since it would ultimately produce human calories via the meat furnished by the cattle. But here the animals were the first obstacle encountered, by going on a hunger strike and ultimately dying when the bitter and indigestible food was forced upon them in admixture with grape skins, potatoes or molasses.

König first tried transforming part of the cellulose into glucose during the cooking of the wood,[22] for which purpose he gave a preliminary treatment with dilute hydrochloric or sulphuric acid before the regular cooking, as his attempts to replace sulphurous acid entirely with strong acids and ammonia did not give a good pulp.[23]

Stutzer[24] proposed rendering the sulphurous acid non-injurious by adding formaldehyde to the liquor, and transforming the excess into urotropine by the addition of ammonia, excess of which would not be injurious, but on the contrary beneficial in the feed, as it would be neutralized by the organic acids and is easily assimilated by the animal organism. It is doubtless the last-mentioned fact that induced König to attempt to prepare pulp exclusively with ammonia; but, apart from the fact that the process did not give a good pulp, at the high temperature used there were formed toxic amino compounds.

If the negative results of all these experiments had still left any doubt as to the impossibility of using sulphite waste liquor for the preparation of cattle feeds, this doubt has been absolutely dispelled during the war, when dire necessity forced the Germans to try every conceivable artificial process for the production of foodstuffs. It can be laid down as a general principle that the high temperature required for the production of chemical pulp renders indigestible those portions of the plants which might have been considered for nutrition purposes.

H.—Fertilizers

Hence, the use of sulphite waste liquor for fertilizer is the only one, besides that as fuel, which could absorb the whole production. It was formerly suggested by Tilghmann, the inventor of the sulphite process. It is the only use for which it is not absolutely necessary to evaporate the liquor; though it must generally be resorted to for other reasons, mainly to reduce transportation charges. At the suggestion of Stutzer and Lassar Cohn, the Königsberg sulphite mill sprinkled the liquor on the land in the neighborhood of the mill, after addition of lime to neutralize the acidity, and good results were observed, due to the organic matter contained in the liquor. The calcium sulphite is fairly rapidly oxidized to sulphate, which is an efficient fertilizer under certain conditions.

But the beneficial effects of the organic compounds is not sufficient to increase the value of the artificial gypsum formed to such an extent as to compensate the cost of evaporation, which would be necessary for transportation at any distance. It is also claimed that this fertilizer clogs up the pores of the soil.

From a practical standpoint the main consideration of the pulp mill would be to produce the fertilizer in the form of a dry, non-hygroscopic powder to facilitate spreading on the land, for the farmers are in the habit of spreading all fertilizers dry, in spite of the fact that soluble fertilizers at least, such as potash and ammonia salts, are more easily applied when dissolved, for instance in liquid manure. Hygroscopicity can be overcome only by mixing the dried solids with other dry substances, those with fertilizing properties being naturally chosen, such as Thomas phosphate,[25] calcium cyanamide,[26] a special grade of kieselguhr (infusorial earth) containing organic matter,[27] quicklime, potassium silicates,[28] or peat (Stutzer).

The mixture containing Thomas phosphate has been used in agriculture under the name of "Knoesel meal". The sulphurous acid content of the liquor increased the solubility of the phosphate.

Trainer[29] suggested the transformation of the sulphite into sulphate by the action of oxidizing bacteria, and then fermenting the liquor (without recovery of the alcohol), thereby increasing the nitrogen content owing to the albuminoid compounds of the yeast. It should be noted, however, that any nitrogen obtained from the yeast would have to be supplied to the latter, as it cannot assimilate atmospheric nitrogen directly.

Conclusion

We thus see that there are but two uses which could absorb the enormous quantities of sulphite waste liquor: fuel and fertilizer. Its use as fuel absolutely requires evaporation to dryness, while this is not indispensable to the production of fertilizer. The lime and sulphur interfere with combustion, whereas agriculture can use them as fertilizers; and at the same time the return to the soil of the mineral constituents of the wood which were extracted by the liquor is most welcome.

There remains to consider the value of the organic matter.

It has not yet been considered of any great importance to agriculture. It has recently been recognized, however, that organic matter is as necessary

[22] French patent 469,768.
[23] German patent 265,483.
[24] French patent 402,871.
[25] Arlt and Knoesel—German patent 128,213.
[26] Knoesel—French patent 423,562; M. Muller—German patent 252,473.
[27] Kern—German patent 278,492.
[28] Kressel—U. S. patent 1,225,825.
[29] German patent 283,931.

and as important to plant life as are potash and phosphates. It is decomposed in the soil, with production of carbon dioxide; and this gas, which is indispensable to plant life, is absorbed through the leaves and is used in building up the cellulose and lignin. It is present in the atmosphere only in very small quantities, and by increasing the amount artificially certain crops have been doubled and even trebled (potatoes, beets, etc.). These tests, which were carried out in Germany by distributing flue gases over the ground by means of suitable piping, cannot be carried out on a large scale.

Waste vegetable matter and other organic matter supplied the carbon dioxide required by living plants —without the help of any piping—long before the advent of man. The carbon dioxide liberated is partially transformed into carbonic acid by the moisture of the soil, and renders soluble the elements required by the plants, namely, potash and lime. The carbonates are absorbed through the roots, and the carbon is assimilated. Before being finally converted into carbon dioxide, the decomposing vegetable matter passes through several stages during which it can be assimilated, thereby eliminating a considerable portion of the synthetic work which must be accomplished when starting directly from carbon dioxide.

But we have not yet mentioned the most important factor: the soil bacteria, which live on the various organic matters found therein, decomposing them and giving off carbon dioxide. The importance of the soil bacteria is still insufficiently known to us; but it is well appreciated by the plant which attracts them by secreting glucose through its roots, just as it secretes it in its flowers to attract the insects which it requires for pollenization.

The nitrifying bacteria are generally considered as the most necessary to the life of plants, because a theory has been put forward to the effect that the ammonia found in nature or supplied to the plant in the form of ammonia salts must first be converted into nitrate nitrogen before it can be used by the plant. Of course this theory suited the owners of the Chilean nitrate deposits; but the plants are not quite of the same opinion. It is quite true that they can thrive in the presence of nitrifying bacteria and can make use of the nitrate nitrogen produced; but they are really somewhat of a nuisance, first of all because nitrates do not suit the plant as well as ammonia (as shown by Mazé in spite of Muntz's theories to the contrary), and secondly because nitrates are even more easily washed away by rain than ammonium sulphate. Bacteria which transform the inorganic nitrogen into organic compounds (proteins) which are not washed away by rain, are therefore to be preferred.

But the most valuable organisms are undoubtedly those which have the power of fixing atmospheric nitrogen; for it is they that have supplied the nitrogen requirements of the vegetable and animal kingdoms since the beginning of the world. And this difficult work, which by the Claude process requires a pressure of one thousand atmospheres and a temperature of 600° C., is carried out by those infinitely small organisms at ordinary temperature and pressure as a regular function of their vital process. To carry out this work they require very little besides organic matter, in the form of waste materials such as waste liquor or farm yard manure. It is on account of the work of the soil bacteria that the farmer gives preference to manure over all artificial fertilizers.

And what advantages can fuel from waste liquor offer as compared to this? Merely a small amount of calories, a considerable proportion of which was required to evaporate the liquor. The carbon dioxide from the fuel is discharged into the asmosphere, whereas that from the fertilizer is generated and largely imprisoned in the soil where it is readily accessible to plants. By burning the liquor, the mineral constituents are lost, while the fertilizer makes them available to the plant, including the sulphur, which is as necessary to bacteria as to the plants.

But there is still another very important advantage in favor of fertilizer. Before applying the liquor to the land as fertilizer, it can be subjected to appropriate treatment to extract valuable substances. The production of fertilizer could thus be made the starting point of other chemical industries which would greatly increase the value of the substances found in the liquor.

This is undoubtedly the direction in which further investigations should be carried out.

When the Paper Industry Was Young

The late Thomas Beckett of Hamilton, Ohio, who died a short time ago, in telling the story of his life in the paper business, said that in the early days it was thought that paper could not be made with steam power, but that water power was always necessary. The early paper makers in Ohio burned wood for fuel, although vast coal fields were near at hand, because it was said that the steam made with coal was not uniform in quality.

Mr. Beckett said the first machine was sixty-two inches wide and was designed to make 2,000 pounds of newsprint per day, although it was not able to make quite as much as this. It had a wire fourteen feet long without suction boxes, and was equipped with two driers, twenty-eight inches in diameter.

About 1876 Mr. Beckett said he heard of a paper machine running at 150 feet per minute, which no one believed possible.

Some sulphite pulp had been bought about this time, but several years afterward the 2,000 pounds were still on hand as none of the paper mixers dared to use it for fear of injuring the quality of the newsprint.

In the early eighties ground wood was being used in some mills, but for a long time it was regarded with suspicion.

As we smile at those old paper makers and their ignorance, will the paper makers of the future dig up our present-day prejudices, which we call wisdom, and make sport of them?—Lombard News Letter.

THE CIRCLE

Paper makes Money
Money makes Banks
Banks make Loans
Loans make Poverty
Poverty makes Rags
Rags make Paper

The most trying man to deal with is the one who doesn't know what he wants and is impatient because he doesn't get it.

Waste in the Pulp and Paper Industry

Power Plants

By B. T. McBAIN
3rd Vice-Pres., Am. Pulp and Paper Mill Supts. Association

THE third largest cost in the converting of paper pulp into paper is power. By power, I mean power for moving machinery and steam for drying. Very few paper mill power plants were given much consideration up to a very few years ago, because coal was then so cheap that most plants gave the fuel or power costs very little thought. However, with coal costs mounting up until they are now in many places more than twice what coal could be delivered at the mills, it made "Power" a different story, especially as labor and all other raw materials and repair parts went up at about the same pace.

To quote E. P. Gleason, General Engineer for Nepco Mills: "Power costs are nearly 40 per cent of the total conversion cost in most mills" and with this fact staring us in the face, we will try to touch upon some of the places where the average mill shows in the waste column in connection with power plants.

There are various kinds of power used in pulp and paper mills: direct connected water wheels to machinery, hydro electric, steam turbine direct and steam turbo electric, steam engines direct and steam engines driving electric generators.

Each one of these items could be touched upon separately and make a good story, but we will touch upon the ones most generally used in pulp and paper mills of America at the present time, the steam plant, including boilers and engines.

Coal is a new fuel to me; my experience being mostly with the burning of cord wood, hog and oil. But for the past three years, I have seen so many coal burning plants that should be in the junk pile, that experience in the burning of coal is not needed to call attention to the waste in the operation thereof.

In one plant visited recently, they were firing coal by hand to old, fire tube boilers, carrying only 80 pounds of steam. I asked when they were installed and was told about 30 years ago. There was no record kept of the amount of water evaporated nor of the efficiency and when the steam pressure went down, when a digester was steamed, everything just slowed up "that was all."

There are still quite a few of these antiquated boilers and steam plants in use and they are wasting coal and labor, besides production of paper, which is the life of the industry.

Then, there were long steam pipes from the boiler room to the digesters and others to the steam engines driving beaters and paper machines. There were here and there 90° elbows in many places but worst of all, very few of these pipes were covered. On asking the reason for this latter, I was told that the covering was left off purposely because they needed the heat to keep the mills warm. Of course, they separated the water at the engines but the loss in pressure and heat was considerable between boilers and final point of use.

The old steam pumps used for boiler feed were wasteful, but the worst sin I believe, was that the condensate from paper machines and other engines was not being used, and the boiler feed water came from the river in the main. The engine drives were in poor alignment and there were many shafts and countershafts, pulleys and belts before the power was finally applied.

In the drying of the sheet, the exhaust steam from engines was used, with live steam for make-up, but they exhausted into the atmosphere at a considerable pressure.

This plant with four paper machines, making 75 to 80 tons per day could afford to install an entirely new boiler plant, equipped and operated up to the minute. They could install a bleeder type steam turbine to produce the power economically and yet supply the steam for drying. They could equip each paper machine with motors to replace the old engines and pay large returns on the new investment, at the same time so greatly reducing the power and steam cost of their product as to put that plant on the right side of the ledger from savings in waste in the steam power plant alone.

I hear it said that there are not so many such power plants in use today. I venture to say that of the older paper mills of the United States, fifty per cent of them are still operating boilers installed a generation or more ago and still operating them on the same basis as they were at that time.

Much work has been done and is still being done on the power plants of pulp and paper mills of America, but it seems to me that either the power plant people are asleep at the switch and not pressing the matter sufficiently, or else the management of these mills should insist upon their superintendents joining the ranks of the American Pulp & Paper Mills Superintendents' Association, that they might learn how to save the great sums still being wasted in steam in the pulp and paper mills today.

My next story will touch upon "Fibre Mills" whose sins are many.

A good cylinder oil mixed with tallow or tallow soap makes a reliable form of grease for the power plants.

Pointers for the Engineer

By W. F. SCHAPHORST, M. E.

Origin and Quantity of Oil

IT DOES not seem to be positively known where the oil in the ground came from or how it got there. Two prominent authorities, Mendelejeef and Pyhala, now agree that highly heated metallic carbides in considerable quantity are to be found in the interior of the earth. When these carbides come in contact with moisture they decompose into metallic oxides and hydrocarbons, and, presto, we have oil as a result. This is the so-called "inorganic theory." That is, they claim that oil is a result of action or reaction of inorganic or metallic substances.

Believers in the organic origin state that oil is the result of decayed vegetable and animal matter. Earth pressure, natural heat, natural distillation, and time are claimed by these adherents to be contributing causes. The writer is merely passing this along as an item of interest. He does not profess to know anything about it himself.

As for the amount of oil still existing in this earth, and available, the following figures are credited to M. Gault. The numerals represent barrels:

U. S. and Alaska	7,000,000,000
Russia and Siberia	5,836,000,000
Persia and Mesopotamia	5,820,000,000
South America and Peru	5,730,000,000
Mexico	4,525,000,000
Central America	3,550,000,000
East Indies	3,015,000,000
China	1,375,000,000
Japan and Formosa	1,235,000,000
Rumania, Galicia, E. Europe	1,135,000,000
India	995,000,000
Algeria and Egypt	925,000,000
Canada	95,000,000

Basing his computations upon the above figures the writer has estimated that the world will have ample oil supply for at least 100 years. At the same time it must be remembered that there still are many unexplored regions and that the earth's oil supply may be only slightly "scratched" at the present time.

Why Do Boilers Explode?

I WAS glad to read the comment by F. W. D. in the January number regarding what I wrote on the above subject in the December, 1923 number. I am sorry that F. W. D. did not give some actual figures supporting his contention that water tube boilers have more water in them than do fire tube boilers of the same horse-power. I have never seen anything but figures to the contrary, yet, those figures may have been wrong. As for violence of explosion that is largely a matter of personal opinion I presume and we could never come to an agreement on that. I agree with F. W. D. that lap joints are bad but I know of some very violent explosions of the butt strap type of boiler also. As a result of F. W. D.'s letter I made some inquiries amongst engineer friends and was told by some of them that both of us are partly right and partly wrong, all of which is more or less meaningless. Nevertheless, my own personal opinion still is that water tube boilers seem to be more and more approaching the "flash type" as they call it, whereas fire tube boilers are not changing so much.

Burning Pulverized Coke

ALTHOUGH Henry Ford is not in the paper manufacturing business, engineers in paper mill power plants will, nevertheless, be interested to know that in his River Rouge power plant he proposes to obtain the full benefit from his coal by coking it and utilizing the by-products.

It is estimated that from each ton of coal the following by-products will be obtained:

1—1,500 lbs. of coke,

2—7,000 cu. ft. of 700 B. T. U. gas,

3—5 gals. motor fuel stripped from gas,

4—20 lbs. sulphate of ammonia from gas and condensation liquor,

5—25 to 30 gals. of very light tar of a crude oil like character.

The coke will be pulverized and used for fuel under the boilers. Also it is stated that the tar will be further treated for other by-products such as motor fuel, creosote oil, lubricating oil, grease, etc.

Henry Ford is a believer in utilizing all resources and in wasting nothing.

What Size Hoist?

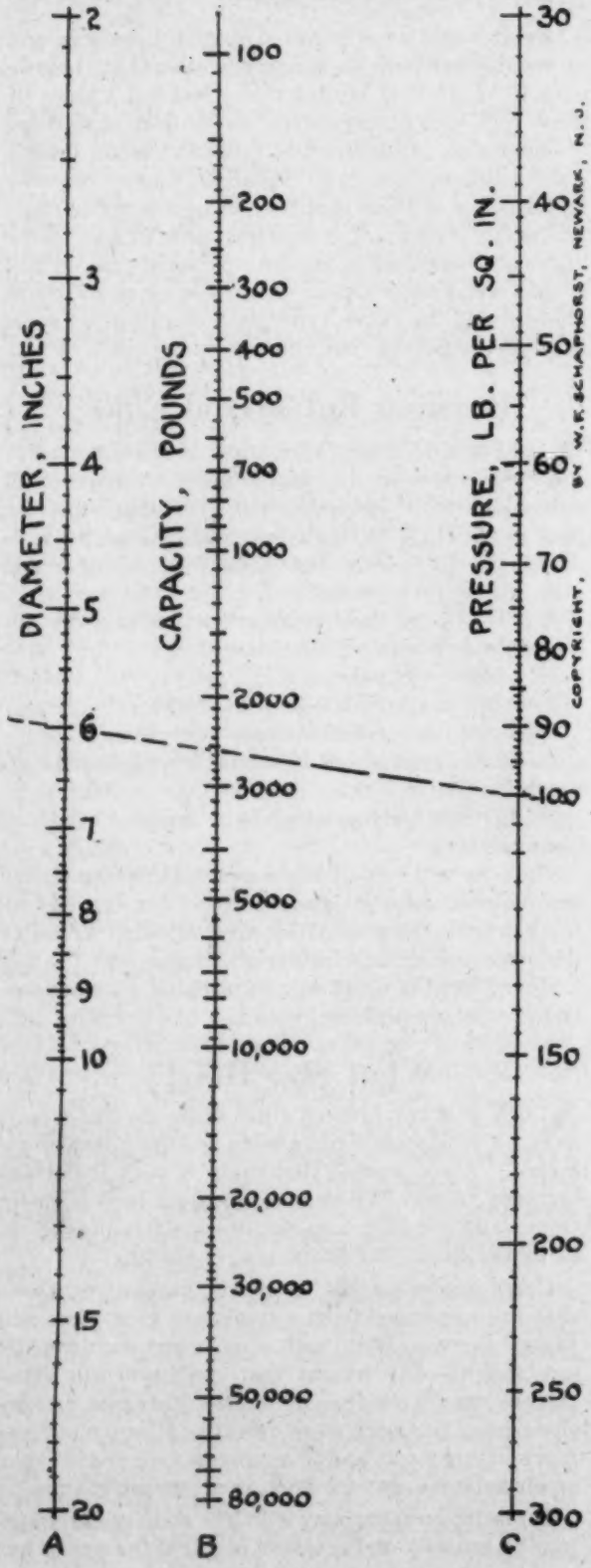
NOW that compressed air is being used so freely, air hoists are coming more and more into prominence. Air is rapidly becoming a very important economy factor. There is no medium that is easier to get and use than air, because it surrounds all of us all the time. Its initial cost is nothing.

Users inform us that air hoists, particularly those that are suspended from a track, are great time and money savers. With such a hoist one man can lift any weight—any weight that the hoist will lift—thereby saving the time of several other men and besides doing the work more quickly. If any plant has much lifting to do, and if compressed air is available, an air hoist will pay for itself in a very short time.

To assist in selecting air hoists and for determining the capacity and pressure required the writer has

prepared the chart herewith, which eliminated all figuring.

For example, if you have an air hoist 6" in diameter and an air pressure of 100 pounds per square inch, the dotted line drawn across this chart connecting the 6 in Column A with the 100 in Column C shows in Column B that it will lift a trifle over 2,500 pounds. Thus, simply connect the known diameter in Column A with the known pressure in Column C and the intersection through Column B gives the capacity in pounds.



On the other hand if it were desired to choose an air hoist having a capacity of 2,500 pounds, knowing the air pressure to be 100 pounds per square inch, the same dotted line would give a diameter of 6 inches.

In other words, run a straight line through any two known factors and the intersection with the third line gives the answer. Thus, again, the same dotted line would show that if you want a capacity of 2,500 pounds and you have an air hoist whose diameter is 6 inches, a pressure of 100 pounds per square inch will be needed to produce the desired capacity.

The chart, as will be noted, has a great enough range to take care of any ordinary requirements, the diameters ranging from 2 to 20 inches and the air pressures from 30 to 300 pounds per square inch. The capacities, Column B, range all the way from 100 pounds to 80,000 pounds, or 40 tons.

The Power Show

IT HAS been called to my attention by the H. S. B. W. Cochrane Corporation that in my report of the New York Power Show in THE PAPER INDUSTRY, I overlooked the exhibit of the Cochrane Flow Meters and the Multiport Back Pressure Valve in their booth. Also, I should have mentioned them under the heading "Water Treatment" because, as they say, "that is pretty near our whole existence."

The error is mine and I am sorry. I visited their booth, and saw the exhibits plainly enough, but it so happens that in their case I neglected to put it down on paper immediately and that's why I failed. I hope this "explanation" will tend to make things right.

Errors in Books

THE writer frequently runs across errors in rules and statements in books that may prove to be more or less serious, should they be blindly applied without first carefully checking them up.

For a while I used to bring errors that I discovered to the attention of the publishers or to the attention of the author, but in most cases my criticism would not be acknowledged. Not once has any publisher acknowledged receipt of my letters of criticism or suggestion. As a result, when I find an error today I simply make a notation on the margin of the book and let it go at that.

The proper way, it seems to me, would be for the author and publisher of the text or handbook to

solicit criticisms and to have errors pointed out. Then after a sufficient number of errors have been received compile an "error sheet" and send it to all the possessors of the book. Or, probably a less expensive way would be to publish the error sheet in the advertising pages of publications in the fields in which the book is used.

Unless mistakes are brought to the attention of authors or publishers the same errors are liable to be published in succeeding editions, so that the possessor of a first edition who may want a second edition must go over the entire second edition and correct the errors in it that he discovered in the first edition, which makes it very inconvenient. For that reason I often delay the purchase of a second edition of a hand book as long as I can.

Unfortunately it is almost impossible to get out a hand book free from typographical errors, but would it not be worth while for the publisher to make a serious effort at eliminating all errors? The best way to do so, from my viewpoint, is to solicit the aid of all users of the book and to at least be grateful for any such gratuitous assistance received.

Or, should the publisher prefer to pay for corrections, a payment plan might be still better. Let the publisher offer to pay a dollar or two for "every mistake" found. Then in publishing the error sheet the name of the first finder of the error could be given so that others could not claim the "prize"—if it could be called a prize. Offering to pay for mistakes found would probably tend to make both author and publisher more careful in producing the book, would indicate confidence in its accuracy and tend to increase its sale, and would stimulate users of the book to "look for mistakes" and would caution them to be more careful in applying formulas, rules, etc. So far as the writer knows, no book is infallible.

Superheater Care

THE advantage of keeping superheaters clean is interestingly pointed out by a user who stated that before steam purifiers were installed, superheater tubes were replaced on an average of one per week, per boiler. After installing the purifier not one has been replaced to date, which at the time of writing was nearly a year ago.

Also because of the elimination of moisture by the purifier they report 45 degrees higher average of superheat, which means an increased turbine efficiency of approximately 4 per cent. Also they state that previous to the installation of the purifier they washed out the superheater every time the boiler was out of service and they always found considerable mud and dirt. Now upon washing out the superheater the water comes out "crystal clear."

It's foolish how we rush through life,
And cry that time is on the wing.
We're living in eternity.
And time is just a clock-made thing.

The Successful Foreman

By RICHARD A. CLAYTON, Jr.
Alton Boxboard and Paper Company

HAVE you ever been confronted with the question, "How do you like your boss?" In the paper business, as in all other industries, there is lots of room for discussion on this subject. Now I would ask the paper mill foreman, "Are you an aggressive and competent foreman?" In becoming a foreman in a paper mill one should take upon himself certain obligations to the concern.

Industry has advanced to the stage where the man at the head of a department is hardly known as just the "boss." Your foreman is, or at least should be, able to do all the work just as his men are expected to do it. Does your foreman pitch in and give you a lift once in a while? Each customer, as you know, expects to have his board shipped to him in first-class shape and each foreman in turn should stipulate the necessity for using utmost care in handling each customer's product. Possibly one customer will desire extra yardage and the foreman should explain this to the less experienced man whom he cannot expect to know this. Less experienced men will invariably tie up bundles which are uneven and will thereby become "string cut" before arriving to the customer. Roll board is just as important as sheet board and many little things which are unnoticed by an ordinary workman should be easily and quickly "snapped up" and corrected by the foreman.

I am only a foreman myself but I would have my readers know my idea of an aggressive foreman before closing. Remember that you are working to give the customer just what he wants and when you satisfy the customer you invariably satisfy the man at the head of your concern. When the quality of your paper reaches a certain desired standard your production almost automatically takes care of itself in the paper mill.

As a lasting impression of a good foreman let me burn this one thought into each reader; you should be an example to each and every man working under you. Let them see that you are working for them the same as they are working for you. Show them that you are interested in their welfare; give the man who wants to learn the job just ahead of him all the information he wants and show him how to do anything on the machine; he'll not take your job, unless you deliberately make it possible for him to do so. Don't get the wrong impression of what I am saying for none of us can be perfect, but try to the best of your ability to be an example for the men working for you. Make them tell the other fellow, "I sure like my foreman." Let your employer say, "I've always got a job for him."

Many ideas grow better when transplanted into another mind than in the one where they spring up.
—Oliver Wendell Holmes.

Editorial Comment

By WILLIAM SIBLEY

Oil

OIL is a key factor in Industry. Without oil, machinery could not operate—ships could not sail—airplanes could not fly—automobiles could not run. Without oil, commerce would cease, or where oil does not actually generate the power, it is used for lubrication. A monopoly of oil would mean speedy victory for the nation holding such monopoly in time of war. The lack of oil in any nation would be tantamount to defeat.

For a number of years three groups have been seeking to extend their individual influence in oil production. These groups are: Stinnes combine (German); Deutsche Schell Company (a British corporation); the Standard Oil Company (American). These groups have been particularly keen to extend their interests in Asia Minor.

For some time the Anglo-Persian Company maintained a monopoly of the pipe lines emptying into the refineries on the Persian Gulf. These lines absolutely controlled the production and distribution of Persian oil. American interests, however, wanted the right to secure concessions in Persia. The arrangement, at that time, led the State Department (through our Open Door policy) to force the British to give such concessions to the Standard Oil Company.

This condition continued until the political upheaval in Persia shortly after the War. The new government that came in force at that time refused to recognize the right of the Standard Oil Company to exploit Persian oil. Only after a quarrel over royalties was the British interests allowed to continue their activities. It was under this new regime that the Standard Oil interests were passed over to the Stinnes group—through Mr. Sinclair, an American. The Sinclair negotiations made at that time are still in force, and, according to Sinclair's testimony, cannot be terminated except by the Persian Parliament.

About this same time, Mr. Sinclair negotiated with Mussolini, in behalf of the Stinnes group, for the sole right to exploit Italian oil. African, Russian, and practically all European oil, as well as European coal and iron, is almost completely controlled by this Central Powers combine.

It was this expansion and these groups that tapped American oil reserves (through Sinclair and Doheny). This was done by the established European method—that of providing retainer fees, stockholderships, etc., to those in influence. Probably many of the men involved had no knowledge, at the time, that they were contributing to a world domination of oil. Our faith in some of the men whose names are linked with this scandal is too strong to be swayed by the superficial knowledge many newspapers are now displaying.

The present oil "scandal" is merely the fruits of the oil competition and intrigues started long before the war—at about the time the Kaiser was planning his "Berlin to Bagdad Railroad,"—and around which intrigue the war centered.

Who won the War?

Teaching Communism in the Schools

WITHIN the month, Chicago has been host to some 12,000 representative educators. They came from every part of the United States to attend the N. E. A. Convention.

It was at this convention that the details of a new $25,000 "educational peace plan offer" was formally disclosed by Dr. A. O. Thomas of Augusta, Me. Dr. Thomas said, at the time of his announcement, that there was little possibility of affecting a peace plan along the political lines. He said that it would nescessarily be along educational lines. He informed the assemblage that any one was eligible to the competition and that there were but two restrictions, viz: the manuscript must be limited to 5000 words and that they must be in his hands by July 1, 1924.

Some of the statements made in his talk on this new offer are interesting—and worthy of thought. According to Dr. Thomas, Youth is in revolt—"struggling for the freedom that will make finer honesty possible."

It was further stated by Prof. Charles F. Rugh of the University of California: "The root problem of democracy is developing the right sentiment toward authority and obedience. The revolt of youth is but one aspect of the world movement against external authority. It is the struggle of humanity to strip the past of the power to paralyze the present and prejudice the future. In the new and ever changing world why should we follow the rules and regulations of our forefathers, who seem to have made a pretty bad mess of things?"

It is interesting to know that George Washington, Lincoln, Webster, Jefferson, Franklin, and some of the rest of our forefathers "made a pretty bad mess of things" when they drafted the Declaration of In-

—— on Timely Subjects

dependence, the Constitution of the United States, the Emancipation Proclamation, and some of the other documents under which we have prospered and grown to world domination!

Whether these educators are conscious in their knowledge that they are furthering Communism in advocating such principles, we are not prepared to say. We do know, however, that a few of those sentenced for sedition during the war and some of those who have been identified with Socialism and Communism for many years are now on the lecture platforms of the United States—spreading the gospel of Communism to college and high school and grade school students, as well as the laboring class.

It is a bit difficult to convert the present day leaders of this country to Communism. So they are working with the more impressionable youth—the school children. We will see the fruits of their efforts in from five to twenty-five years.

Poor and Rich

NOT long ago, we chanced to meet, in the smoker of a Pullman car, a man who owned several coal mines in Pennsylvania and West Virginia—one who controlled the destinies of a bank (and numberless mortgages)—who was a large stockholder in several industrial enterprises. His face was lined with worry, his hands were white, his appetite poorly, his heart cold. He was on his way to battle the Labor Union and sinking back into the seat cushions he strove vainly for slumber and rest. He was feared and hated by men.

More recently we met Tony, the man who sells balloons. All day long he tramps the hot and dusty pavements. He owns nothing save his powerful lungs with which he blows his horn—and a wonderful appetite. Tired and worn at night he rests his head on a hard, uncomfortable pillow, improvised from a folded, tattered coat. Yet in his dreams he sees thousands of little baby faces—and they smile and coo at him.

Get the Proper Balance

BUT for two things, you are the same today as on your birthday. Heart, lungs, liver, feet, arms, all the same. Nothing changed save your mind, and that only because of two things.

The men you have met—
The books you have read.

There is a thought there for the thinking man.

Coal

IN COAL towns, built, owned and maintained by coal producers, there lives over 2,500,000 people. Of this number 845,000 are actively engaged in mining coal. It costs this industry, in new equipment and supplies about 400 millions of dollars to produce 600 million tons of coal. Of the $400,000,000 expended for equipment each year, $75,000,000 is spent for electrical supplies.

Over 200,000 miles of trackage goes to make up this industry's transportation system, both surface and underground. 750,000 mine cars operate over this trackage.

All of which is still more interesting when we know that a large percentage of the coal producers are going out of business during the next year or two.

The recent Jacksonville agreement between the United Mine Workers and the bituminous coal producers settles the labor problem in the unionized bituminous mines for a period of three years. But with this settlement has arisen another and more momentous question for every mine owner whose property is affected by the contract.

As at present developed, the bituminous coal industry of this country can produce two tons of coal for every one that is needed by the industries and homes of America. Nor is it possible to imagine any combination of circumstances that will sufficiently alter the demand to absorb the excess production. This means that with no cessation of mining activities—no strikes—the industry will have to undergo a shrinking process. A portion of the production capacity will have to go out of business, at least until need begins to overtake that capacity.

The problem of elimination which now begins will amount to the survival of the fittest. In the meantime there will be a buyer's market in coal. Coal will sell, very largely, on a price basis. Without doubt the coming months will see the coal prices fall perceptibly. Without doubt the coming months are going to disclose who among the bituminous coal producers are business men and who are opportunists.

The "house organ" is not a new idea. There are two house organs being issued regularly today which were started in 1878. System, Business, The Dodge Idea, Printer's Ink, Collier's, Harper's and Scribner's were all, originally, house organs. It is estimated that $10,000,000 was spent on house periodicals during 1923.

How Production Is Affected by Methods of Firing Boilers

Suggestions for Firing Hard Coal That Will Help You to Hold Constant Steam Pressure and Maintain Maximum Machine Speed

By JAMES T. BEARD, 2nd

This is the first of a series of articles on the power plant of the paper mill. Each of these stories will have helpful, practical ideas, showing how plant tonnage may be increased and power and maintenance costs decreased by common-sense methods in the making and use of steam.

AT FIRST glance it would seem that shoveling coal into a boiler furnace ought to be an easy job for a husky, able-bodied fireman. Little intelligence seems to be required to handle a scoop and a certain amount of practice should develop a first-class stoker.

That would be true if the job of firing boilers in a power plant was just a case of shoveling coal from the pile onto the grates, or of keeping the stoker hoppers full and seeing that the grates and blowers were working. But it is more. One of the differences between a good fireman and a poor one shows up in the steam pressure that he can keep on the boilers. The man who lets his pressure get down just because the live steam is opened up into the drier rolls may be a good coal passer but he is no fireman.

When the man in the boiler house knows how to handle his fires so that he can keep his pressure up and give them all the steam they need in the mill, he knows more about firing than just shoveling coal. He is a valuable man because he keeps the paper machine running at full speed turning out as much paper as the mill can handle.

To understand why the job of firing in the boiler room means so much to plant production, we ought to start at the beginning and find out just where the power plant fits in the paper mill.

First of all, in a steam plant, there must be enough steam at the right pressure to turn the engines which drive the paper machines. If the pressure is low, the engine speed drops, the machine speed falls off and the paper tonnage drops. If the boiler pressure gets too low the engines may stop. And then the paper machine stops production and profits stop and there's the devil to pay.

Second, there must be enough steam to supply the drier rolls. The amount of steam needed may be large or small, according to the run of paper stock. But it must be there when it is needed. If there is not enough exhaust steam to do the work, then live steam must be used.

It sometimes happens that when live steam is opened into the rolls it pulls down the boiler pressure, so that the paper machine may slow down. In extreme cases it may stop production altogether.

Test of a Good Fireman

To keep the boiler pressure always where it ought to be is the fireman's job. How well he does it depends upon how he handles his fires. He should aim at all times to have them in good condition so that he can meet sudden demands for steam without losing the steam pressure, slowing down the driving engines and materially affecting the plant production.

The handling of the fires in the boiler house depends largely upon the kind of coal that is burned. The purpose of this story is to offer some practical suggestion for firing anthracite coal. The firing of soft coal will be described in a later issue.

When hard coal was first discovered in this country, those who found it thought it was not of very much value as fuel because it was so difficult to burn. It seemed to smother the fire.

This smothering effect is one of the important things to guard against in handling a hard coal fire. If a large amount of hard coal is thrown onto the grates at once, the result is just the same as if a blanket had been thrown over the whole fire bed. In fact, an experienced fireman may do this very thing if he wants to deaded his fire very quickly, in case his water level has gotten too low and he wants to avoid trouble from heating the boiler metal.

Too much coal, therefore, kills the heat of the fire. The temperature in the furnace is reduced at the same time and the boiler may stop steaming altogether until the fire has burned up again. In some cases, where there is more than one boiler on the same header, the steam generated in the other boilers may flow not only to the engines and to the drier rolls, but also into the boiler that has just been fired, thing if he wants to deaden his fire very quickly, in that boiler. Instead of making steam, therefore, that boiler is using steam and perhaps actually condensing the live steam into water again.

For this reason, it is important to spread hard coal thinly over the fire bed, instead of killing the heat with a thick blanket. It must be spread evenly,

otherwise it will burn out in spots, leaving other places unburned. When this happens, cold air from the ash pit rushes into the furnace through the burned out spots and cools the temperature and kills the steaming capacity of the boiler.

Dark spots in the fuel bed are not usually detected with the naked eye, since the brightness of the rest of the fire dazzles the eyes, so that they cannot be seen. They can be seen, however, through smoked or dark glasses. And when they appear they should be covered with fresh coal.

It is not enough for a fireman to watch his pressure gauge. That is all right as far as it goes. But it does not tell him the condition of his fires. He might have a good steam pressure and still have a fire that is full of holes and burned out spots. If the machine tender should suddenly open the live steam into the drier rolls and the fireman should be caught with a poor fire, his steam pressure would drop before he could get his fires back into shape again.

To keep his fire in good condition at all times, therefore, the fireman should not only fire thinly and evenly, but he should fire often enough to prevent holes burning through the bed. Once the fire has gotten too irregular, through burning in patches, it is practically impossible to get it back into condition until the whole fire has been cleaned.

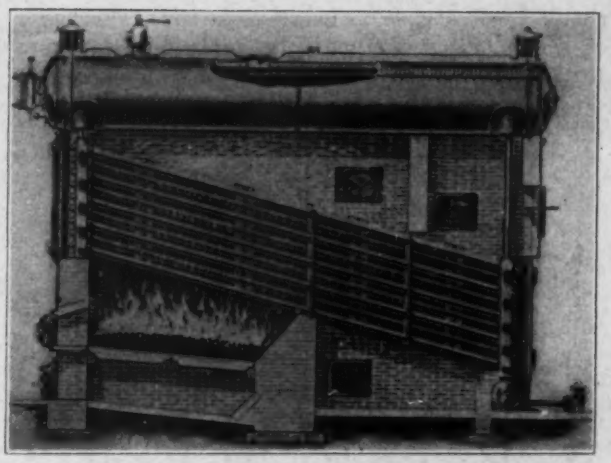


Fig. 1—Correct method of firing hard coal. Note the thin fuel bed. The coal is spread evenly over the grate surface and the ash is not allowed to accumulate too thickly before cleaning the fires

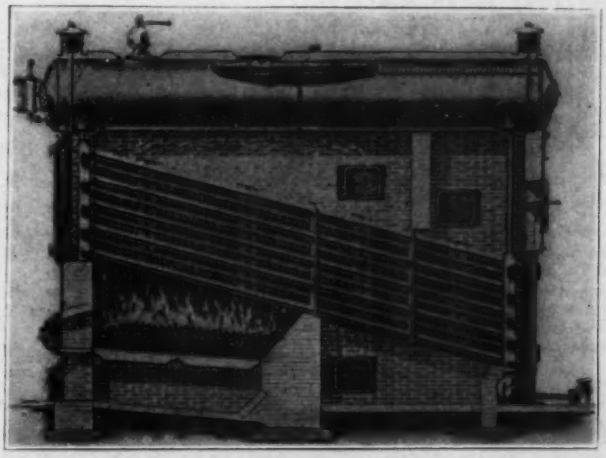


Fig. 2—Poor results are always certain if the coal is fired too thickly. Fire little and often should be the "hard coal slogan." When fired too heavy this fuel blankets the fire and the steam pressure drops, slowing down the paper machine and decreasing plant production

Don't Slice Hard Coal

In firing hard coal it is important to use the fire tools as little as possible. The coal should be spread by the motion of the scoop when it is fired, and the fires should not be sliced or "barred." Stirring up a hard coal fire only mixes the hot live coals with the ash. In this way the ash is sometimes heated so hot that it melts into a bad clinker. Clinkers always give trouble when cleaning fires. They may also prevent good air distribution through the fuel bed and may cause uneven burning of the coal. When such a condition develops is is impossible to do much with it until the fires have been cleaned and the clinkers dumped.

Clinker formation may sometimes be prevented by introducing a small jet of steam into the ash pit. The wetness in the steam breaks up the clinker as it is sucked with the air through the fuel bed. It is a mistake to use more steam than just what is needed to break up the clinker. Too much steam will decrease the efficiency of the boiler.

It is impossible to lay down any fixed rule about the thickness of fuel bed that should be carried for best operating results. This thickness will vary according to the kind of coal that is burned from six inches to perhaps nine inches. For some grades of coal it may even be as low as four inches. The thickness that gives the hottest fire and highest temperature in the furnace is the best.

Whatever that thickness is, however, the fireman

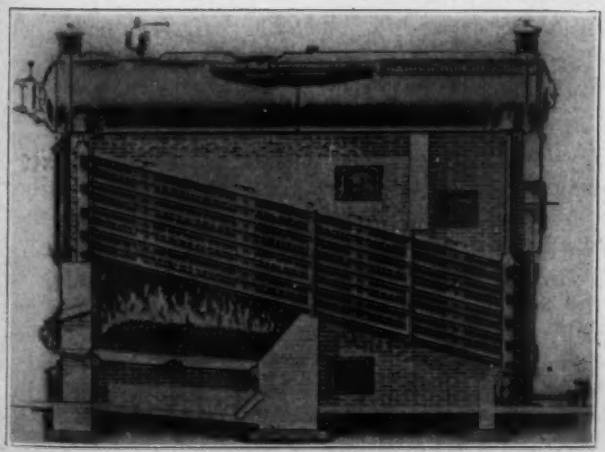


Fig. 3—Keep the fires in good condition. Do not let the ashes get too thick. Clean the fires often or they will get sluggish and, when the sudden load comes on, the steam pressure drops, slowing down the paper machine

should try to keep it, as nearly as he can. There are, of course, exact methods of finding out just how thick to carry the fires. To describe them would involve too much of the technical side of the theory

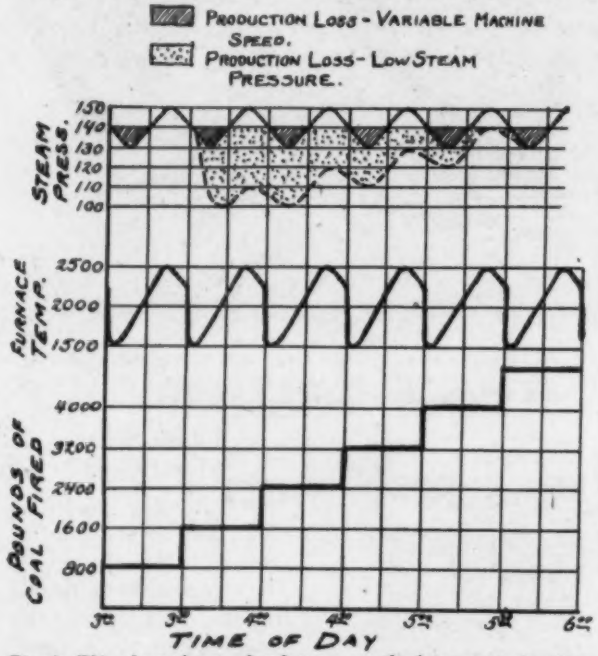


Fig. 4—This chart shows what happens to the furnace temperature and to the steam pressure when the coal is fired too heavy. Notice that when the steam pressure drops the paper machine slows down a bit. And, if the live steam is opened up suddenly into the drier rolls, just after firing, the steam pressure may get so far down that it will be hard to get it back up again. All this means loss in paper tonnage

of combustion and they are, therefore, omitted.

Just after cleaning, the fire bed is the thinnest. As the coal burns to ash the thickness of the bed increases, as the ash accumulates on the grates. With a poor coal (one that is high in ash) the thickness will increase faster than with a good coal (one that is low in ash).

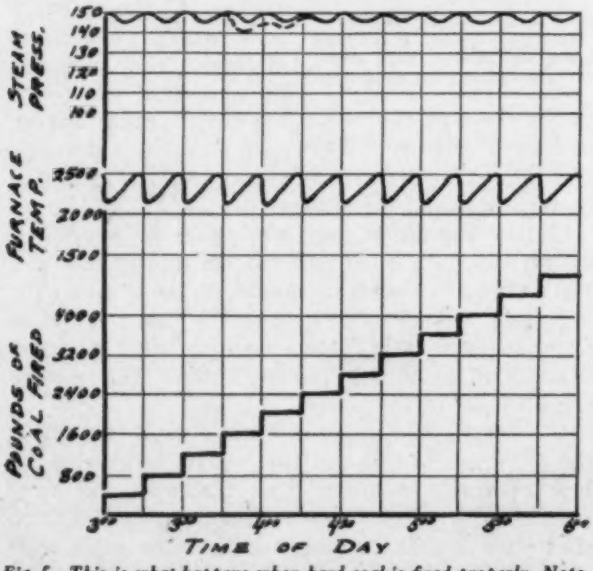


Fig. 5—This is what happens when hard coal is fired properly. Note the steam pressure does not vary enough to affect the machine speed. Also that the fires are kept in good condition, so that when the live steam is opened up into the drier rolls the fires act quickly to meet the increased load on the boilers. The paper machine does not slow down and maximum production is maintained

Eventually the fuel bed becomes so thick that the fire gets sluggish and does not burn quickly. When this happens the steaming capacity of the boiler is lessened. If the fires get too thick, any sudden demand for live steam could not be met quickly, because the fires would act too slowly. The steam pressure would then drop, the engine slow down and the machine speed would decrease and production would fall off.

The fires must therefore be cleaned often enough to keep them in good condition and ready to meet any sudden load demands on the boiler. This may call

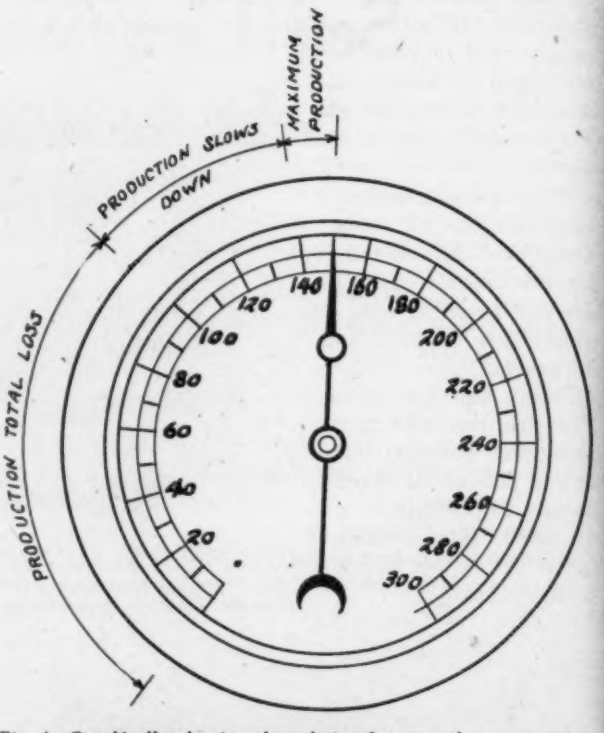
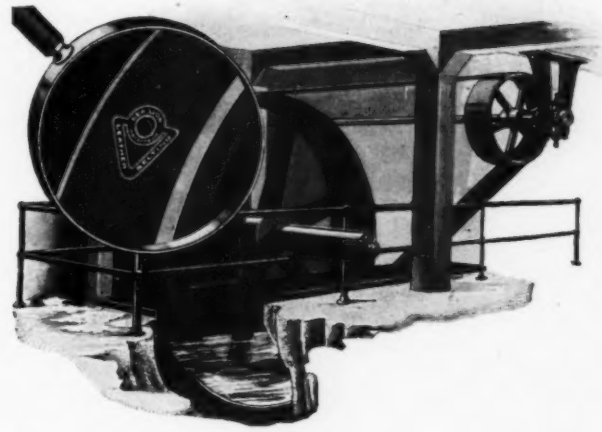


Fig. 6—Graphically showing the relation between the steam gage in the boiler house and paper tonnage in the mill

for cleaning fires twice a shift, or once every tour may be sufficient, according to the quality of the coal and the size of the grate as compared to the size and capacity of the boiler.

During the time that is required for cleaning a fire and for a certain time afterwards, the boiler is delivering no steam to the line. It is dead. The actual cleaning, therefore, should be done as quickly as possible so that the boiler can again be placed in readiness to meet its share of the load.

Owing to the difficulty of igniting hard coal a certain amount of care is required in cleaning hard coal fires. After carefully burning down, all live coal is brought to the front of the grate with the hoe. After-



Sea Lion waterproof leather belts have the pre-tested guarantee

Pre-tested Sea Lion waterproof belts are guaranteed to be waterproof. Both the leather itself and the cemented joints are waterproof. The laps and cemented joints are guaranteed not to come apart through the action of water and each belt is further guaranteed for the life of the belt to be perfect in stock and workmanship.

In addition to these guarantees, each Sea Lion belt has its *exact test rating guaranteed by the Chicago Belting Company*. The test ratings of leather belts are the *only* tests of quality in advance of purchase there are. Test rating guarantees are the most positive of all claims of quality and give more protection to the buyer.

You can run a Chicago Belting *pre-tested* Sea Lion belt continuously in water and the belt will not open up at the laps or come apart. The reason for this is that the Sea Lion waterproof cement used in cementing the laps and plies has a celluloid base—and water does not affect it in the least. The cement is imbedded into the very fibre of the leather and the cemented parts are just as strong as the leather itself—taking practically the same test for tensile strength.

Sea Lion belts on calenders and beaters give remarkable service. They transmit power without loss and *require very few if any take ups.* Chicago Belting *pre-tested* belts have the reputation of requiring less take ups than any other belts. They are stretched and tested in manufacture so that all of the stretch is taken out without breaking down the fibre or loosing elasticity.

Sea Lion *pre-tested* leather belts are for those paper mills where the highest known grade of waterproof belting is desired. For a continuous, uninterrupted service that is better than you have heretofore secured from leather belts, specify Sea Lion *pre-tested* leather belts. *Pre-tested* is a comparatively new word in leather belting—but it is a word that means more to the buyer of belting than any other. Our test ratings of leather belting eliminates all bluff as to quality and obligates the belt maker to a definite specification that produces more uniform high quality—more actual standardization of the finished belts. There is no other method of belt buying that will mean so much to your production. Write for prices and free samples.

Sounds reasonable. Guess I better mail the coupon and be informed

TEAR OFF HERE

Chicago Belting Company, Chicago.
118 North Green Street, Chicago.
Please send me without charge or obligation, samples and prices of Sea Lion pre-tested waterproof belting.

Firm .....

Address .....

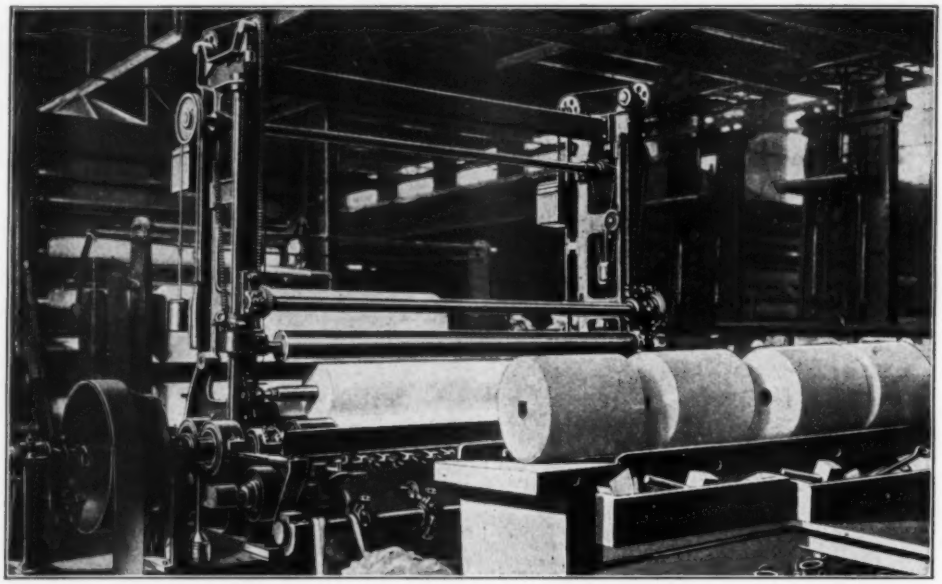
Att'n of .....

Chicago Leather Belting

Write for Prices

Chicago Belting Company
Manufacturers of Leather Belting
118 North Green Street
Chicago, U.S.A.

Literature on pre-tested belting sent on request



This shows one of two LANGSTON TYPE "CA" WINDERS in the mill of Fletcher Paper Co., Alpena, Mich.

They have been using LANGSTON WINDERS for some ten years.

Yours for Service

Sam Langston

SAMUEL M. LANGSTON COMPANY

CLEAN

CAMDEN SHEAR CUT CUT N. J., U. S. A.

Agents: Toronto Type Foundry Company, Toronto, Ont. T. W. & C. B. Sheridan Co., London, E. C. 1

wards, the back section of the grates can be dumped.

After raising the rear grates again the live coal on the front grates is spread over the rear section and the front grates dumped. After raising the front, live coal is then spread over the entire grate area. Fresh coal is then spread on the grates evenly and not too thick.

In burning hard coal it is not necessary to admit air over the fires. Sufficient air reaches the coal through the fuel bed from the ash pit to completely and efficiently burn the coal if it is fired properly.

The accompanying illustrations and charts show correct and incorrect methods of firing hard coal under a common type of steam boiler. They also show what happens to the steam pressure, machine speed and plant production when coal is improperly fired into the boilers and how correct firing methods improve plant production by maintaining a uniform steam pressure, supplemented by sufficient heat reserve in the furnace to meet sudden demands for live steam in the drier rolls.

The methods suggested in this article are both simple and practical. In paper mills where they have been used they have been uniformly successful. In some cases they have resulted in an increase in plant tonnage of from 10 to 15 per cent, without increasing fuel or labor costs. In a plant that turns out 50 tons of paper a day, this means that careful and intelligent attention to the handling of the fires in the boiler house may effect an increase in production, so that 55 tons of paper could be produced at no greater power or labor cost than before.

Is Conservation Adrift?

By OVID M. BUTLER
Editor, American Forests and Forest Life

WHAT is the conservation policy of the American people? Two recent events have brought that question uppermost in the mind of every thinking conservationist. One is the Teapot Dome testimony, with its cloudy background of lax federal stewardship in the handling of the public resources. The other is the report of the Senate Committee on Reforestation, with its alarming revelations of a depleted forest supply.

The Teapot Dome case, magnified as it may be for political effect, has created in the public eye a picture of sordid conditions of "boring from within"; natural resources supposedly safely conserved against the time of national need turned over to corporate interests by anti-conservationists, temporarily in control; permanent destruction of what was supposedly permanently saved for national defense. It is not to be wondered at that the exposures have challenged the security of the conservation cause as a settled public policy, and have caused deep concern and distrust in the minds of many people as to national progress in the conservation of our natural resources. Are we moving forward or backward in the development of our conservation policies? Or, are we merely drifting on a turbulent and confusing sea of political expediency and industrial propaganda designed to retard conservation?

For answer we must turn to the Federal Government as the agent entrusted with the commission of carrying forward a broad and stable program of national conservation. A vast number of people have complacently rested in the thought that the basic conservation principles of the government were for the most part settled. Are they? What are these principles, and are they being adhered to by our Government in spirit and in action?

The Teapot Dome revelations, significant as they may appear, may be set aside for the moment When Mr. Fall was appointed Secretary of the Interior, the federal policy of conserving public forest resources had become well recognized as a definitely established principle. Mr. Fall was known to be bitterly opposed to that principle. He was an openly declared anti-conservationist in spirit and in action. When he was thwarted in his plans to have transferred to his jurisdiction the National Forests in the western United States and in Alaska, many people construed the result as a conservation victory, although the nation was left in doubt as to whether the administration was supporting Mr. Fall or the defender of the principle, the Secretary of Agriculture.

The Fall episode was not an indication of progress. It was a senseless obstruction in the path of the conservation movement—a costly mistake resulting from administrative wavering from a clear-cut conservation policy. Mr. Fall was permitted, if not encouraged, to precipitate his fight to scuttle the very best conservation agent of the Government, the Forest Service. In doing so, he first lifted the curtain upon the instability and indecisiveness of the conservation policy of the nation, as exemplified by the representative government at Washington. Had our policy been as clearly and as securely established as it should have been, and as sacredly respected by the party in power, Mr. Fall's aggressive campaign as a freebooter of public resources would never have begun.

The unrestrained activities of Mr. Fall, as a trustee of public property, reveal similar governmental instability and confusion in the conservation of other public resources. While Secretary of the Interior he promoted a bill for the creation of the All-Year National Park in the vicinity of his own land holdings in New Mexico, which, if enacted into law, would

The 106-in. Improved Wolf Chipper showing disc arrangement.

The Chipper *that* Reduces Sawdust to Less *than* One Per Cent

This feature alone makes the 106" Improved Wolf Chipper a cost saving piece of equipment. Combined with this are uniform chips, unique safety devices, low power consumption, more production, and mechanical features that do away with much of the wear and the resulting repairs necessary on the old chipper.

Write for further information and let us send you more actual mill experiences like the one reproduced herewith.

Valley Iron Works Company

Plant
Appleton, Wis.

New York Office
350 Madison Ave.

AN ACTUAL MILL TEST

(Name of Mill on Request)
(Test made on hemlock with 20" spout)

Running time	8.25 *Hrs.*
Total Cords	118.29
Cords per hour	14.37
B. D. wt. of wood	293,702
B. D. wt. of sawdust	2,000
Lbs. sawdust cord B. D.	16.9
Per cent sawdust	0.68

have been destructive to the basic principles of National Park conservation. It is significant of the point that his bill was actually passed by the Senate and it was defeated primarily by the protest of an indignant public, aroused by men and organizations wholly outside and unrelated to the government.

Four years ago the Water Power Act and the Coal, Oil, and Gas Leasing Act were passed by Congress. These bills established the conservation principle that the title to waterpower and coal, oil and gas, owned by the government, should not pass from the government. To men like Mr. Fall, these principles appear to have had no meaning and no sacredness. Nevertheless, the unsympathetic Mr. Fall was commissioned with the public trust of administering those very acts. As long as anti-conservationists are placed in positions of trust over public resources and as long as they are not held to strict accountability in respecting and carrying out established conservation policies, there will be Teapot Dome scandals. They are merely the sordid products of a loose administrative attitude toward conservation.

The absence of definite progress on the part of the administration in carrying forward a broad program of conservation during the past four years is strikingly evident. The situation is one rightly causing widespread public concern. We are still without a constructive policy for the handling of our 220 million acres of public lands, not including the national forests, 150 million acres of which are steadily becoming more and more unproductive because of uncontrolled grazing. In Alaska fires continue to ravage millions of acres of public domain, with no policy yet effected for handling or protecting these lands. Game protection in Alaska is a farce and political make-shift, because Congress fails to provide the amount of money needed for effective game conservation.

Before the war, the passage of the Weeks Law established a federal program for the acquisition of six million acres of forest land on the headwaters of navigable streams. The Federal Government appropriated $2,000,000 annually, for a short period of years, for the purchase of these forest lands, and then, with the purchases only one-third completed, it departed from the program. Thus far, it has refused to restore it to more than 50 per cent of its original scale. For the forthcoming year, the Forest Service, whose administration of the National Forests stands out as one of the brightest spots in the conservation firmament, is now confronted with reduced appropriations.

In the face of this apparent slowing up and dissipation of the conservation movement, the report of the Senate Committee on Reforestation brings home to the nation the urgency of prompt action to assure its people a supply of raw wood. Despite a strong public urge during the past five years, we are still without a national forest policy. The report of the Senate Committee does not expose a hitherto-unknown situation, but merely adds authority to previous investigations which the United States Forest Service has made, but which have failed to stir the government to action. That the situation with respect to our wood supply is critical, Congress must now admit. Will it act? And if it does, will it give the nation the broad, comprehensive policy which the situation imperatively demands?

The Senate Committee on Reforestation has, through Senator McNary, introduced a Bill which provides for constructive legislation and authorizes appropriations. The bill is one which everyone will endorse. Its passage will mark a constructive step forward in formulating a national policy for forest conservation. It has strong public support and it should be enacted at once. Bills somewhat similar have been before Congress during the past several years. Congress has turned them aside. If the McNary Bill suffers the same fate, the present administration will indeed have lost the opportunity to restore public confidence in its conservation platform.

Looking back over the past half decade, what, therefore, is the conservation policy of the American people as exemplified by their government? The public, it may be suggested, is entitled to know. It is now the time and place for the political parties which will seek the support and confidence of the people at the coming election to restate their conservation principles so clearly and unmistakably that all doubt will be removed. And, having stated them, the public must demand that these principles shall be promoted as actively and as sacredly as the Constitution itself. For sixteen years the anti-conservationists appear to have known in advance who the presidential candidates, if elected, would appoint Secretary of the Interior. It is time the conservationists should make similar advance inquiries and act accordingly.

Machine Room Organization

By HARRY WILLIAMSON

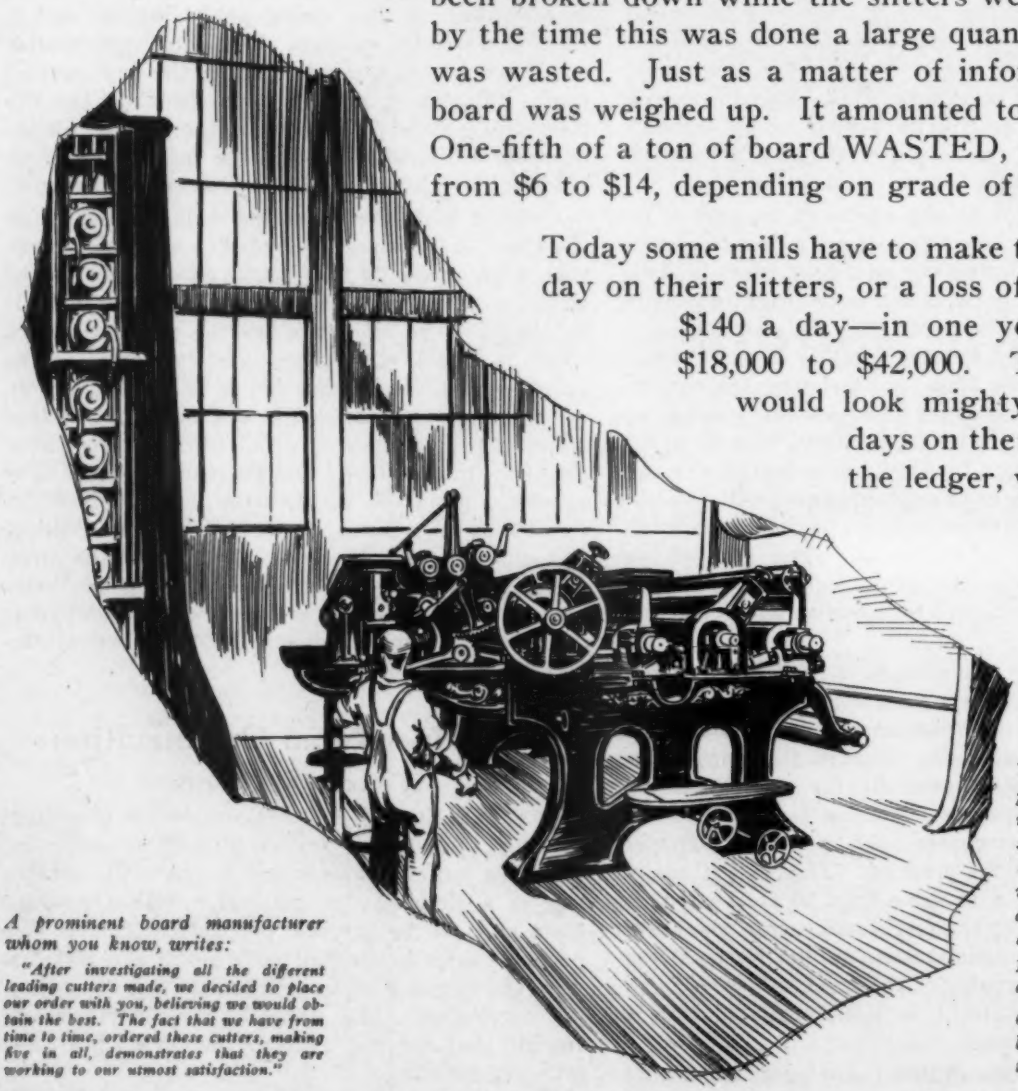
ACCORDING to Webster, to organize is to arrange systematically; to provide with officers and rules, etc. The writer is aware that to quote the vocabulary of a dictionary in connection with a machine room may not be apropos, particularly during such periods known as "haying out"; yet, it is a fact that were the meaning of the word, organize, to be literally carried out, there would be very little occasion for any but the most proper diction during those selfsame periods.

The efficiency of any system is proven in times of stress, and the Paper Machine Room, owing to its 24 hour schedule, the variable quality of the "stock," and the nature of its product, is frequently subject to emergency tests. The primary object of a machine room superintendent is to obtain the maximum pro-

Save $18,000 to $42,000 Annually

ONE of our representatives went into a board mill recently and stood at the slitters when widths were being changed. The sheet had been broken down while the slitters were re-set and by the time this was done a large quantity of board was wasted. Just as a matter of information, this board was weighed up. It amounted to 420 pounds! One-fifth of a ton of board WASTED, or in dollars, from $6 to $14, depending on grade of board.

Today some mills have to make ten changes a day on their slitters, or a loss of from $60 to $140 a day—in one year a loss of $18,000 to $42,000. This amount would look mighty good these days on the credit side of the ledger, would it not?



A prominent board manufacturer whom you know, writes:

"After investigating all the different leading cutters made, we decided to place our order with you, believing we would obtain the best. The fact that we have from time to time, ordered these cutters, making five in all, demonstrates that they are working to our utmost satisfaction."

The ***Beloit Duplex Slitter*** *is arranged so that the sheet is NOT broken when changing widths. Simply swing a lever and the job is done— with perhaps four sheets thrown away at the cutter.*

Can YOU afford to be without this attachment NOW?

Beloit Iron Works **Beloit, Wis., U. S. A.**

SINCE 1858 BUILDERS OF BOARD AND PAPER MILL MACHINERY

duction of the highest quality paper at a minimum cost from the materials placed at his disposal. That last statement is important because the stock, particularly in the manufacture of newsprint, is made or marred before it ever comes under his control.

Broadly speaking the machine room organization may be classed under three heads.

Charts and Reports; Clothing and Upkeep; and last, but by no means least, Labor.

Let us then go through an imaginary day with a superintendent who has systemized his department and who also enjoys the closest co-operation with the other departments in the mill.

Arriving at the felt room, we find on the desk the tachometer chart showing the speeds of the machine and record of lost time for the previous 24 hours; the machine tenders' reports showing orders completed, order then running, and causes for lost time; the boss machine tender's report showing condition of wire, felts, belts, quality of stock at the completion of his tour, together with his comments on the night's run; the steam chart with its record converted shows us the number of British thermal units consumed to dry the paper. The report from the beater room showing number of beaters dropped, weight and proportion of furnish used to each beater, loading and sizing materials used, temperature of stock and level of stock in beater room chest at the completion of each tour, will put us in touch with conditions in that department.

Armed with the information derived from this data, we are prepared to take our morning walk through the mill presenting either a smile or a corrugated brow according to the context of the various reports. While we are away, the sample clerk will obtain samples from each reel, and cut, weigh and test them. He will type his report in triplicate, one for himself, one for the machine room bulletin board and one for our file. This report will show the date, name of machine tender, order number, number of samples tested, average weight, highest, lowest, and average test, together with the moisture content test which he will receive from the laboratory.

From the finishing room foreman, we will also receive a daily report for file purposes showing date, name of machine tender, weight of paper shipped, weight of paper culled, and causes for culling same. Another daily report from the same source will show paper shipped to date from first of month, orders for to-day, expected shipment tomorrow.

Weekly, semi-monthly and monthly reports from the sample clerk showing average weight per ream, and average test maintained by each machine tender, completes the Chart and Report portion of our system.

Under the second head, Clothing and Upkeep, our superintendent is in his own particular domain for keeping down costs, and, being wise with the years of experience he enlists the fullest co-operation of his machine tenders by placing at their disposal all the data he keeps concerning this important branch.

His principal sources of cost are: clothing; lost time; belts; and lubrication.

To ensure that wires and felts longest in store shall be used first, the following record is useful:

No.	Date Received	Make	Date Put on	Taken Off	Days Run	Remarks
17683	10/12/23	Lindsay	11/10/23	2/18/24	59	Trim Edge

The following record sums up the running life of any article of clothing at a glance:

MONTH ENDING JAN. 31st, 1924

	Dec.	S.	M.	T.	W.	Th.	F.	Sat.	S.
Wire	20	x	...	...	...	...	...	...	x
Jacket	63	x	...	...	...	...	...	69	x
1st Felt	3	x	...	...	...	...	...	...	x
2nd Felt	5	x	...	...	...	...	...	...	x
3rd Felt	10	x	...	...	...	...	...	...	x
1st Top Dry	55	x	...	...	...	...	...	...	x
2nd Top Dry	60	x	...	...	...	...	...	...	x
1st Bottom Dry	70	x	...	...	...	...	...	...	x
2nd Bottom Dry	75	x	...	...	...	...	...	...	x

MONTH ENDING JAN. 31st, 1924

	M.	T.	W.	Th.	F.	Sat.	S.	Min. Expected	100%
Wire	...	...	...	...	...	...	x	50	60
Jacket	...	...	...	...	...	...	x	60	70
1st Felt	...	...	...	...	...	27	x	27	28
2nd Felt	...	...	...	...	...	...	x	36	40
3rd Felt	...	...	...	...	...	...	x	44	50
1st Top Dry	...	...	...	...	...	...	x	90	100
2nd Top Dry	...	...	...	...	...	...	x	100	110
1st Bottom Dry	...	...	...	...	93	...	x	90	100
2nd Bottom Dry	...	...	...	...	...	99	x	100	110

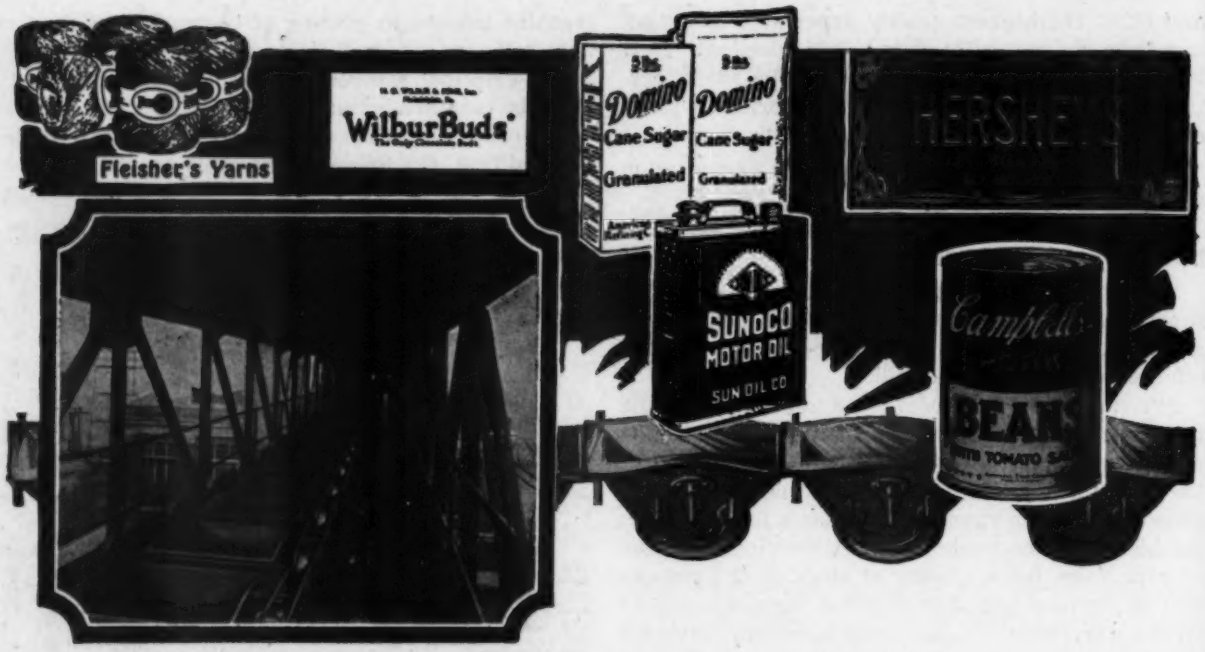
The life of press felts varies in each mill according to the kind of paper made and the quality of water used. There is one factor, however, which is a constant on all paper machines, and that is the condition of the press rolls.

Our superintendent therefore keeps an accurate record in his repair book of the amount of "crown" on each roll, when ground, thickness and resiliency of rubber, and average load exercised on the journal by the weights and levers.

A similar record is kept concerning the bottom couch roll, and breast roll, and it is not a bad plan to include a record of the calender rolls. Realizing that putting on clothing, general repairs, etc., are a frequent source of unnecessary lost time, our friend, the superintendent, has formed some very definite rules pertaining to this matter.

All accessories for putting on a wire are located in one specific corner of the machine room, and woe betide the individual who fails to replace same after using. Ropes, chains, and rope blocks for putting on felts are hung on their respective hooks in the felt room. A tool box containing an adequate supply of wrenches, hammers, etc., is found in the same place. In another box in the felt room will also be found spare parts for wire and felt guides, together with end keys to fit the set screws. This little precaution certainly saves lost time and may be the means of saving valuable clothing.

To obviate loss by breaking belts, a simple card index is kept, showing drive of belt, make, length, width, ply, hooks used, when put on, and when taken up. Also, for handy reference, a full chart is conspicuously placed showing the details of every belt on the machin



An Investment of $400,000.00 in Jeffrey Carriers *by* 6 Industrial Leaders

The six Industrial Leaders whose well-known trade marks are featured above, are using 16 Jeffrey Pivoted Bucket Carriers for the handling of large quantities of bulk products such as coal, ashes, sugar, vegetables, etc. The Jeffrey carrier is specified wherever year-in and year-out service without shutdowns is required.

The original cost of the Jeffrey Pivoted Bucket Carrier is many times offset by preventing costly shutdowns. Quality in materials used, material strength and hardness of wearing parts means long and satisfactory service for the Jeffrey Carrier.

A few of the Long Service Qualities embodied in the Jeffrey Carrier are: Steel Side Bars of high carbon; Glass Hard Double Bushings; Large White Iron Rollers; Tough Malleable Iron Overlapping Lip Buckets, etc. All wearing points in chains are hardened and ground.

The Jeffrey organization, its engineers, its equipment and its two generations of experience are at the disposal of Industry to meet its present needs.

The Jeffrey Mfg. Co., 944-99 North Fourth Street, Columbus, Ohio

New York Charleston, W. Va. | Philadelphia Cincinnati | Boston Milwaukee | Pittsburgh Detroit Montreal | Cleveland Chicago | Scranton St. Louis | Denver Los Angeles

JEFFREY
MATERIAL HANDLING EQUIPMENT

Position Wire Drive	Length	Width	Make	Ply	Hooks
Straight	32'	10"	Rubber	8	3/3"
Winder Cross	35'	8"	Rubber	6	3/2"

In the basement a locker is kept containing hammer, hooks, square, cutting knife, pulley rope and hammering block.

Before shutting his machine down to wash up, each machine tender is required to give one-half hour's notice to any millwright or mechanic he requires to execute repairs, so they may be on the job with their tools as soon as the stuff gate is closed. Of course this is not always possible but time has proven the value of such a rule.

The oiler is supplied with a storage tank and filter and is required to keep a daily record of oil drawn from store, oil used, and oil in tank. Unless he is one of those persons, and they exist, who dispose of their oil supply via the sewer, a close check on his daily record of oil used should eliminate lost time through burnt out bearings.

So far we have been chiefly concerned with daily records. In this business as in any other, it is necessary to condense accumulated data monthly. While this work is usually done by the "Efficiency Expert," it is so clearly a part of the machine room system, to omit it would be a mistake.

LOST TIME AND OPERATING EFFICIENCY REPORT FOR MONTH OF ——

Time Lost on Paper Machine	Hours
Putting on wires	2
Putting on jackets	½
Putting on press felts	¼
Putting on dryer felts	...
Putting on aprons	...
Changing press rolls	¼
Sew and seam dry felts	¾
Sew and join wires	...
Misc. and small repairs	1¼
Washing up	24
Starting up Monday	2
Total	30¾

Operating Efficiency Record	
Total days run	26
Total product for month	1,791,732
Average product per day	68,913
Total operating hours in mo.	624
Total lost time, hrs.	30¾
Actual operating hours	593¼
Basis weight	32 lbs.
Actual weight	32.08 lbs.
Average trim	109½
Average speed	540
Maximum possible production per hour @ 100% efficiency	3,154 lbs.
Actual production per hr.	3,020 lbs.
Actual percent. efficiency	95.75%
Total No. of pasters	542
Average pasters per day	21
Percentage sulphite used	26.23%
Total beaters dropped	1,585
Average pounds per beater	1,130

= 55,852 Reams ÷ 08/100 Per Ream Heavy = 4,468 Reams

Under the head of Labor, which means our superintendent's ability to get the very best from the men under his supervision, he solves his own problem by perfecting a system which insures the safest running of the machine. His own efforts to maintain as near a uniform supply of stock as possible, the running of clothing only within absolute safety limits consistent with quantity of paper produced, the elimination of the pin pricks of unnecessary trouble by an adequate supply of spare parts and accessories, and finally his own personality.

Paper making is a peculiarly temperamental trade in so far as the operation of the machine room is concerned. Despite any system, bad periods occur, production drops, sometimes an accident to clothing happens. The knowledge that a broad visioned superintendent is in charge, who will render a just judgment, is a great help to the machine crew, and by such knowledge accidents are less liable to occur.

Here Is the Largest Old-Paper Bin in the World

OLD paper and rags, for the cooking to felt, go to play an exceedingly important part in the manufacture of high-grade asbestos products today, and the great producers of such wares, the world about, take every care that there shall always be a super-abundance of both materials around, so that operations need not be suspended until the proper quantity of the waste-material is at hand.

Old paper and rags, used in the quantities in which such concerns use them, go to represent tidy for-

tunes in themselves; and so—as with all other worthwhile material—must be housed and protected otherwise against thieves and the elements.

For just such storing until actual use, a great asbestos-products house in the environs of Cincinnati has just lately completed what is generally conceded to be the largest one-room old-paper bin in the world.

This bin is a structure with walls of very high grade fireproof brick, rising one hundred feet from the concrete floor. Away up at the top of each wall a series of narrow windows may be operated by drawchains from below; for admitting fresh air as desired. These windows, and electric lamps about, provide the light beside. Over the whole there is placed the roof; that is fitted with iron derricks and beams, such that the largest bale of old paper or rags can be carried from any entry-way or room-corner wheresoe'er, and then be dropped at its new site with ease.

Paper Making in Alabama

A PROMISING industrial development of the South has been definitely established through comparatively recent experiments in PAPER MAKING from Lumber Waste, Cotton Linters, Sugar Cane Refuse and other materials abounding in this section.

This supply of raw materials, augmented by excellent distribution facilities, abundant coal supply, chemicals and by-products of almost every kind, dependable hydro-electric power at reasonable cost, low cost of sites and building, ample supply of labor —are other factors of advantage in the manufacture of

Blotting Paper, Book Papers, Wrapping Paper, Paper Boards & Paper Products

Great tracts of virgin timber in Alabama will furnish a vast supply of wood pulp to this industry for years to come.

The manufacturers who are interested in establishment of a paper mill in Alabama are offered the fullest co-operation of the Commercial Department of the Alabama Power Company.

ALABAMA POWER COMPANY
BIRMINGHAM, ALABAMA

PAPER INDUSTRIES EXPOSITION

THAT every paper company which exhibited at the Paper Industries Exposition in 1923 would be represented at the Second Paper Industries Exposition at the Grand Central Palace the week of April 7th was the interesting announcement when the Advisory Committee of the exposition held its recent meeting at the Hotel Belmont. The whole status of the exposition was discussed, and since the meeting letters approving the program have been received from several of the members of the committee who were unable to attend.

The report as to space taken by the paper manufacturers was made on behalf of the exposition by Charles F. Roth and Fred W. Payne and in every case, it was stated, the exhibitors were returned with as large or with larger space, because of the direct business which was traced to the showing made at the exposition last year.

Plans are already actively under way for a special program at the exposition by the Technical Association of the Pulp and Paper Industry, which will hold its annual convention during paper week. A program of particular interest to both technical engineers in the paper industry and the machinery and supply men is being formulated by W. G. McNaughton, secretary of Tappi, which is one of the biggest technical organizations in the country of engineers in a special branch of industry.

A noteworthy feature of the space contracts which are being placed is the number of firms making paper products, which will be represented. The space assigned to the makers of paper specialties is already overflowing, and among the displays of this group will be some of the most unique features of the exposition. Paper cups, boxes, and bags form a small part of this department, which will be one of the most popular phases of the big paper show for the general public which will attend.

Direct mail advertisers will find that the paper manufacturers will give them a particularly fine opportunity to learn of the paper problem, which is so important in their preparation of advertising copy. Most of the big direct mail advertising houses no longer depend on the judgment of the printers for the selection of the paper needed, but specify the grade and quality which will give the type and illustrations the most attractive presentation. The Paper Show will, by its showing of variety of papers, and the special service to be rendered by the exhibiting companies, give the direct mail advertiser the best opportunity imaginable for studying paper, as the material on which the success of his printed matter depends.

Grand Central Palace, New York City

In the paper machinery and supplies group, advance information as to the type of exhibits indicates that there will be even a larger proportion than last year who will have operating machinery as a feature of their booths. The value of the exposition as a means of working with the paper mill executives is not being overlooked by the big chamical companies which have learned from experience that the exposition method is a most satisfactory one for the demonstration of products, and for getting in contact with the paper mills which use their materials.

The Advisory Committee before adjournment decided to send a letter to the entire industry indicating its belief in the Paper Industries Exposition, both as a means of educating the public and the consumer of paper as to paper problems, but of actually bringing about increased business to the exhibitors. The committee consists of the following named gentlemen:

Hugh P. Baker, secretary, American Paper & Pulp Association.
H. J. Berger, editor, "Paper Trade Journal."
J. A. Carpenter, vice-president, National Paper Trade Association.
F. D. Cowdrey, Albany Felt Co.
N. R. Davis, president, American Pulp & Paper Mills Superintendents' Association.
Joseph L. Fearing, International Paper Co. of Chicago.
Hardy S. Ferguson, paper mill engineer.
E. B. Fritz, publisher, "The Paper Industry."
Phil A. Howard, president, "American Paper Merchant."
C. W. Hurtubis, Hammermill Paper Co.
Ralph McKee, Columbia University.
Burton Millar, editor, "Paper."
Fred W. Payne, co-manager exposition.
Frank W. Power, president, National Paper Trade Association.
L. D. Post, publisher, "Paper Mill."
Walter J. Raybold, past president, American Paper & Pulp Association.
Charles F. Roth, co-manager exposition.
George W. Sisson, Jr., Racquette River Paper Co.
E. C. Spear, The Cheney Bigelow Wire Works.
Henry W. Stokes, president, American Paper & Pulp Association.
H. S. Taylor, president, Technical Association Pulp & Paper Industry.
Tom Walden, editor, "U. S. Paper Maker."
Louis E. Wise, N. Y. State College of Forestry.

Some Unusual Exhibits

Three of the most unusual exhibits of paper ever shown will be among the features of the Second Paper Industries Exposition.

Dard Hunter, famous for his unique work in handmade paper, the Seaboard Air Line Railway and the New York State College of Forestry, at Syracuse, will provide these three unique exhibits of phases of the paper industry and its raw material problem. Dard Hunter will be at the booth of the Paper Makers' Chemical Co., where he will actually make handmade paper during the week of the exposition. No man in the country has done more interesting historical research on paper making than Mr. Hunter, and recently produced a book on paper making which was an unusual one-man job, from the making of the paper, cutting of the types to the actual printing and binding of the finished volume. Mr. Hunter not only made the paper on which the limited edition of his book was printed, but devised the type, actually made the type, wrote the text, and set the material in the type of his own manufacture. Then he printed the book on paper he had himself made by hand.

Mr. Hunter's work on early etching, watermarks, and other features of the paper making industry of an historical value has made him the leading figure in the industry in this particular line of work.

The exhibit of the Seaboard Air Line Railway will be to show the possibilities of paper making in the South, but will have some most unusual characteristics. Not the least important will be the presentation of printed matter on paper made from every type of wood grown on the railroad's main line and tributaries. The wood was shipped to the United States Forest Products Laboratory at Madison for test manu-

OUR WELCOME AWAITS YOU

in the "National" Booth at the Paper Exposition

VISIT the "National" Booth in Space 8A when you come to New York for the 2nd Annual Paper Industries' Exposition to be held at Grand Central Palace from April 7th to 10th.

Our Technical Paper Men will greet you. Our display will show the results obtained with "National" Dyes on various grades of pulps and papers.

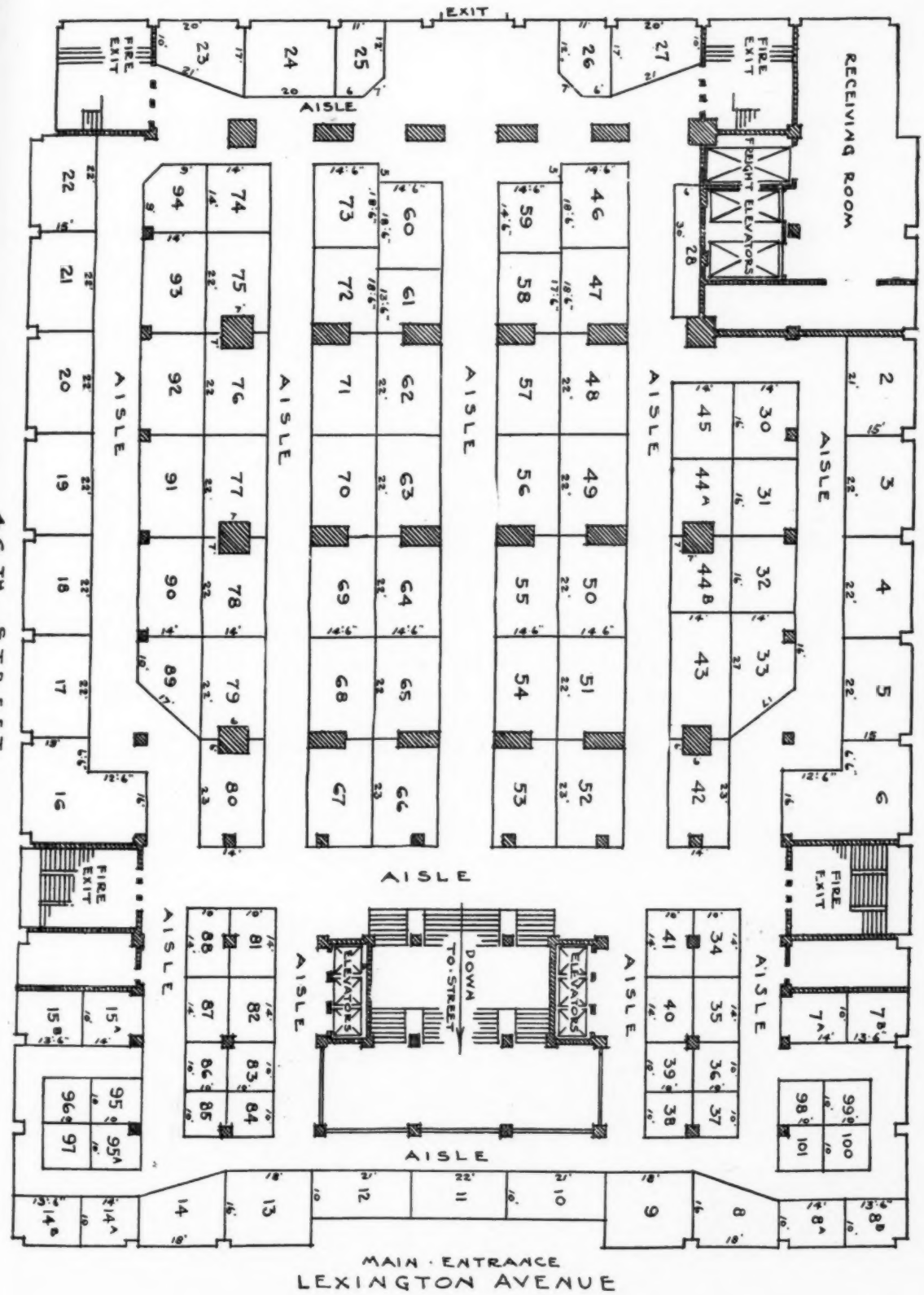
Meet your friends of the "National" organization at our booth. Discuss your coloring problems with them.

National Aniline & Chemical Company, Inc.
40 Rector Street, New York, N.Y.

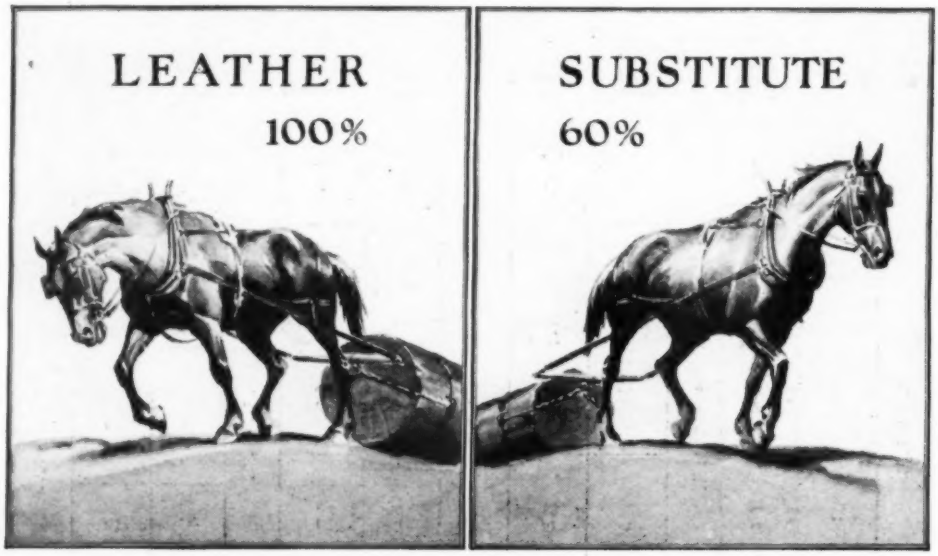
Boston	Philadelphia	San Francisco
Providence	Chicago	Montreal
Hartford	Charlotte	Toronto

"NATIONAL" DYES
FOR PAPER

NATIONAL N DYES

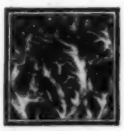


Floor plan of Second Paper Industries Exposition, Grand Central Palace, New York City



Actual tests, made at the Mellon Institute and at Cornell University, have proved that when width, thickness and tension are the same, a leather belt will pull a 40% and up larger load than a substitute.

To make a substitute belt transmit the same amount of power as a leather belt, the tension must be increased till it is *one and four-fifths times greater than that necessary with a leather belt.* This means increased load on machinery, pulleys—increased friction and consequent loss of power.



Leather's fibres! Thousands upon thousands of these tiny fibres give, flex and bend naturally and without internal friction. They give leather its wonderful strength. A leather belt will last from two to six times as long as a substitute.

Leather belts, water-proofed, can be run even under water with most satisfactory results.

Leather belts can be made endless and repaired right on the pulley. This is not true of substitute belts.

Leather grips the pulley. A leather belt with only 1½% slip will transmit 40% more power than a similar substitute belt with the same slip. At 2½% slip a leather belt will produce three times the horsepower of a substitute belt.

Manufacturers are invited to write us regarding their belting problems. Interesting and informative booklet on belting and transmission will be sent you free upon request. There is no obligation. Mail us the coupon on the right.

Address—Research Division

THE LEATHER BELTING EXCHANGE, Forrest Building, Philadelphia

The Leather Belting Exchange is not a company operating for a profit or for selling belts. It is an organization maintained by the leading leather belting manufacturers to promote research work on power transmission and to furnish impartial information on belting.

Nothing takes the place of **Leather**

THE LEATHER BELTING EXCHANGE
Forrest Building, Philadelphia

Please send me your 6 booklets on power transmission—FREE. Also, without obligation, place me on your mailing list for subsequent information developed by your research work on belting.

Name.....

Name of firm.....

Address.....

City.....

Position held.....

facture, and the resulting paper, in various grades, will be the basis of the railroad's exhibit. The purpose, of course, is to show the possibilities of the southern states as a field for paper manufacturing. The presentation, however, is so elaborate that it will attract wide attention from the public, and like Mr. Hunter's work will be of the most intense interest to the general public which will attend the Paper Industries Exposition.

The exhibit of the New York State College of Forestry is promised to be the most elaborate demonstration of forestry that has been shown in the history of the college. Two machines will give a constant change of illuminated pictures of pulp and paper manufacture, and the reforestation measures necessary to preserve the paper industry. The illuminated pictures will be accompanied by an elaborate set of graphs showing forestry conditions with another series of transparencies depicting woodlot problems and forest practice in vogue in different parts of the country.

The pictures and graphs will be cross-referenced by the use of ribbons leading from the transparencies to the wall charts. In addition, there will be actual displays of small trees, set off by green decorations.

The entire display will be of an educational nature, to show the relationship of forestry to the paper industry. Students of the paper course of the college will be in attendance to explain the exhibits to the visitors.

An article on "Creating Sales Through Expositions" in the February Advertising and Selling, particularly mentions the success of the Paper Industries Exposition, pointing out that its value is enhanced by the fact that the exposition is held at the time when the American Paper and Pulp Association and allied associations are holding their annual meetings in New York.

List of Exhibitors

While the list of exhibitors at the exposition is only partially complete as we go to press with this issue of THE PAPER INDUSTRY, the following firms had signed for space up to March 1:

American Paper Merchant, Chicago, Ill.

American Schaeffer & Budenberg Corp., Berry & S. Fifth Sts., Brooklyn, N. Y., and their associate company, the **American Steam Gauge & Valve Co.**, Boston, Mass., will occupy Booth 82, and a complete line of their power plant accessories will be on exhibition.

American Voith Contact Co., 280 Madison Ave., New York City, will occupy Booth 95 and will show their big line of paper mill machinery and appliances.

A. W. Archer Co., Inc., 325 Broadway, New York City, will occupy Booth 64.

Armstrong Machine Works, Three Rivers, Mich., Booth 58, will exhibit a glass model of their steam trap, working under steam pressure and so connected that it will show the entire cycle of operation and also show how the American trap handles air and sediment. All the special features of this trap will be demonstrated through the operation of this model which will be particularly interesting to users of steam traps, where the use of individual traps for draining each paper machine dryer is under consideration.

Becker Paper Corp., 350 Madison Ave., New York City, will occupy Booth 80.

Bird Machine Co., South Walpole, Mass., will occupy Booth 26-7.

Booth Chemical Co., Elizabeth, N. J., will occupy Booth 34, and will exhibit a new type 24 Booth Dry Feeder in operation. This machine is used in the application of Boothal to white water pulp saving coagulation, employed in the company's process for separating white paper into its constituents, —pulp and water. The pulp recovered is made into paper and the purified water is used instead of fresh water. L. M. Booth, Louise E. McGrath and Walter T. Davis will be in charge of the exhibit.

Bachmeier & Co., Inc., 430 W. 37th St., New York City.

Cameron Machine Co., 61 Poplar St., Brooklyn, N. Y., will show the steady growth of a business which has been built upon the idea of doing one thing well in Booth 6. There this company, manufacturers of slitting and roll-winding machines exclusively, will show three of their camachines, representing three main types for the production of small, medium and large rolls of paper and paper boxes.

Camachine 6 will be in operation, actually making miscellaneous small rolls during the exposition. The Cameron principle of slitting and winding, which is a characteristic of the entire line of Cameron Machines, is exemplified thereby.

A Camachine type 10 will represent the middle stage, both in size of rolls produced and in the progress of development towards the high speed mill types, Camachine 12, Camachine 14 and Camachine 18. This Camachine 10, a standard machine for rolls of medium size, demonstrates that a roll-winder of this capacity is advantageous in a great many mills, converting plants, and paper warehouses, as well as in factories manufacturing paper products.

Although both of these machines are being used in paper mills throughout the country, the mill men who attend the exposition will be particularly interested in the Camachine 18, the big brother in the Cameron family.

The exhibit will show a portion of the Cameron line of winders and rewinders which backs up the Cameron slogan, " winder for every roll requirement."

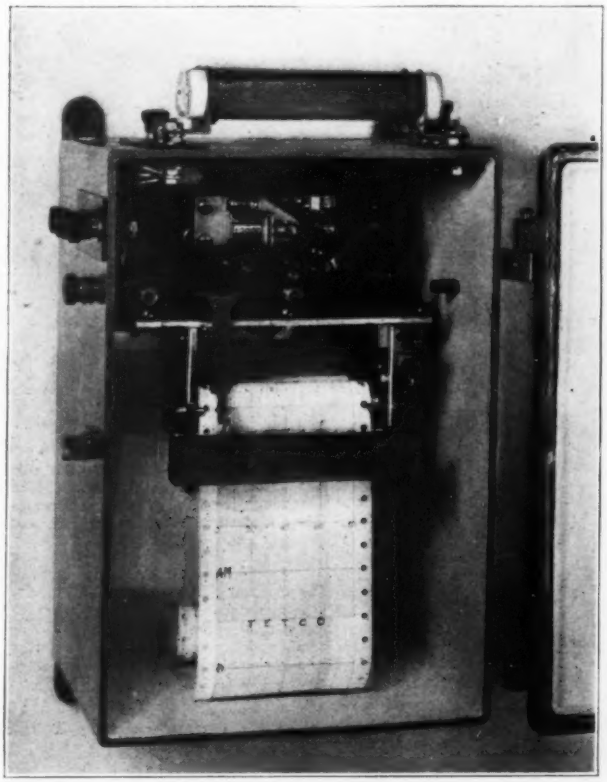
In addition to the machines themselves, a representative exhibit of rolls of different sizes and various kind s of paper, all made on Camachines, will be shown.

Every effort has been made to have the exhibit as attractive, complete and informative as possible. Mr. W. B. Wilshusen, sales manager, will be in charge, assisted by Messrs. J. B. Venturini, W. E. Blauvelt, and J. E. Regan of the sales staff, as well as by Messrs. Schatten, Schiller and Hawkes, who will demonstrate the machines. Mr. Jas. A. Cameron, president of the company, will be there to greet his friends and make new ones.

Canadian Ingersoll-Rand Co., Montreal, Quebec, will exhibit much in the way of paper mill machinery which this company manufactures.

Continental Paper & Bag Mills Corp., 16 E. 40th St., New York City, will occupy Booth 62, and will have a large display of grocers' bags, paper sacks, glassine bags, wrapping, toilet and tissue papers, paper napkins, towels, egg cartons and various kinds of envelopes as manufactured by this company. The above will be in charge of Miss Bloom and Mr. Regan and other members of their staff.

Electric Tachometer Corp., 310 N. 11th St., Philadelphia, will occupy Booth 48. They will exhibit a full line of tachometers for paper mills, both indicating and recording, and also position indicators.



Recorder R-100

The Crane Co., Chicago, Ill., occupy Booth 92 and will exhibit a big line of well known goods manufactured by this company.

We cannot show the entire line of Westinghouse paper mill equipment at the New York Show, so we have selected sectional paper machine drive. Come and see a section driving unit in operation.

Men Who Go ~ to the bottom of things

IF the problems, processes and manufacturing operations of all the industries of this country were alike, then the life of the electrical designing engineer would indeed be Utopian. He could develop one standard and apply it to all.

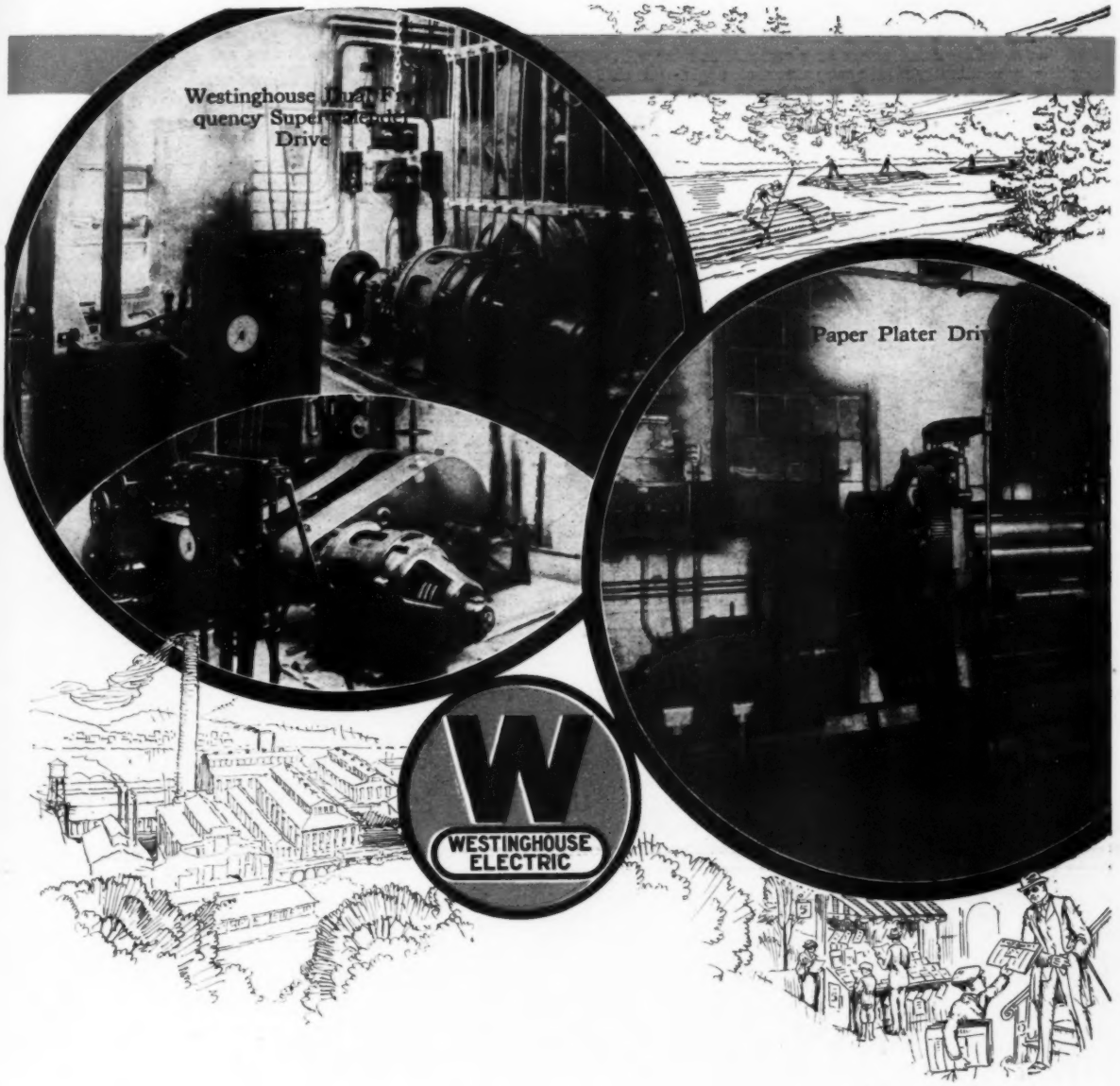
But an example to the contrary is the pulp and paper industry. Here stock is handled in liquid form, through numerous pumps, grinding, mixing and screening operations until it reaches the paper machines, which in themselves are examples of highly perfected continuous process fabrication.

Hence the problems the application engineer is called upon to solve are many and varied and he has proved himself invaluable in the development of Westinghouse motors and control equipment which lives up to the special requirements of the paper industry.

These application engineers come to your plant to learn conditions first-hand. They are the men who are not afraid to put on overalls and get down to the bottom of things. It is at their recommendation and under their guidance that the designer proceeds. No one is better fitted to say whether standard or special construction is

Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania
Sales Offices in All Principal Cities of the
United States and Foreign Countries

Westinghouse



required nor better able to assemble into a harmoniously working whole the different Westinghouse electrical apparatus necessary to paper-making processes and operations.

Familiarity with your manufacturing processes and requirements and intimate knowledge of electrical apparatus enable these men to sense the need for and manner of applying improved methods. Sectional paper machine drive, pulp grinder load regulators, dual frequency super-calender drive and paper plater drive are outstanding examples of Westinghouse application engineering. No company could hope to accomplish the same results without the aid of application experts who have at their disposal every facility for designing, building and perfecting.

Electrical power is your means of eliminating the non-productive motions in your manufacturing processes and in obtaining maximum quality-quantity production at minimum cost.

The Westinghouse engineering organization is always ready to cooperate with you in the solution of electrical power problems. Meet our application experts at the Paper Industries Convention and become better acquainted with these men and their work.

Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania
Sales Offices in All Principal Cities of the
United States and Foreign Countries

Westinghouse

MATHIESON System

Can You Read Between the Lines?

THE Mathieson Multi-Unit Chlorine Tank Car has been approved by the Interstate Commerce Commission. Our specially designed car carrying fifteen one-ton containers of Liquid Chlorine, instead of a single fifteen-ton tank, is now entitled to the same freight rates and privileges as other tank cars.

To the Pulp and Paper Industry, this decision means official approval of a tank car construction ideally adapted to the safe, economical and convenient use of Liquid Chlorine. The Multi-Unit Car, with its individually-weighed containers of exactly two thousand pounds net, provides an accurate unit measure for preparing uniform bleach liquor. In checking and stock-taking there is never any uncertainty as to the quantity of Liquid Chlorine received or on hand.

Over two years ago we voluntarily went to the expense of designing and placing in service the Multi-Unit Tank Car. Upon refusal of the railroad companies to allow us tank car rates, we appealed to the Interstate Commerce Commission for removal of this discrimination, and continued making shipments in our special car. We have assumed all excess freight charges on every movement of this car and during the past two years have paid out over two hundred thousand dollars in order that consumers and the general public might enjoy the many advantages realized in this type of equipment. The recent ruling of the Commission awards us full reparations with interest and completely vindicates our faith in the Multi-Unit "Safety First" principle.

To those who will read between the lines, the story of the Mathieson Multi-Unit Tank Car will exemplify the sound, constructive policy that has made us the leaders in the Chlorine Industry.

The MATHIESON ALKALI WORKS Inc.
25 WEST 43rd STREET NEW YORK CITY
PHILADELPHIA PROVIDENCE CHICAGO CHARLOTTE

Deal Direct with the Manufacturer

EAGLE THISTLE PRODUCTS

Bicarbonate of Soda
Liquid Chlorine-Caustic Soda

Sesquicarbonate of Soda
Bleaching Powder-Soda Ash

Daily Mine Stock Reporter, 150 LaFayette St., New York City.

Dorr Co., 247 Park Ave., New York City, will occupy Booth 33 and will have working exhibits of machinery manufactured by this company.

Downingtown Mfg. Co., East Downingtown, Pa., will exhibit a new design of suction roll, one of their special type of steam joints for dryers, a small model beater and a section of their bandless beater roll showing its construction, as well as a copper covered felt roll. Among those in attendance at this booth at different times will be Mr. Stanley, Mr. Ellis, Mr. Barker and Mr. Kolberry.

Electro Bleaching Gas Co., 18 E. 41st St., New York City, will occupy Booth 10, and will endeavor to show to the paper mill men the advantages of liquid chlorine over other types of bleaching agents.

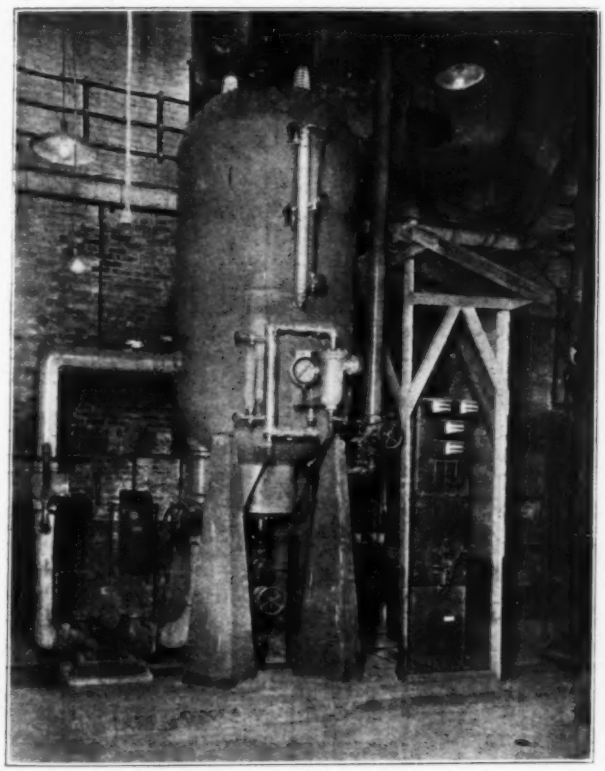
Faatz Mfg. Co., Fredericksburg, Va., will occupy Booth 12.

Farnsworth Co., Norristown, Pa., will occupy Booth 46, and will show their method of removing the condensation from paper machine dryers.

Foreign Paper Mills Co., 72 Duane St., New York City, will occupy Booth 84.

Frederick Iron & Steel Co., Frederick, Maryland, will occupy Booth 89, and will show a complete line of pumps especially suitable for paper manufacturers which this company turns out. Mr. W. A. Riddell and other members of their staff will be in attendance.

General Electric Co., Schenectady, N. Y., will have many interesting things along electrical lines to show paper manufacturers and will have a large force of their engineers in



Electric Steam Generator

attendance to explain the many things that this company manufactures for paper mill men in detail.

Among the items exhibited by the General Electric Co. will be a model of a recent application of an electric steam generator as installed in the Hudson Falls, N. Y.. plant of the Union Bag & Paper Company. This plant is devoted to the manufacture of paper, paper bags and other paper products, and the steam generator recently installed will furnish steam for heating purposes and process work throughout the plant.

The generator is rated 5,000 kilowatt, 6,600 volt, 500 boiler horsepower, and is designed to generate steam at 100 pounds pressure. The generator operates in parallel with other fuel-fired boilers, but its operation is mostly confined to periods of high water and non-working days, when an excess of water is available for operating the power plant generators. In normal times the fuel-fired boilers carry the steam load.

In the Hudson Falls plant the operating conditions are such that the steam demand is very constant and the generator, for this reason, is equipped only with hand control. This consists of a valve in the discharge side of the hot water circulating pump. This valve regulates the water level in the electrode chamber of the generator to such a height as to convert into steam whatever power is available up to the capacity of the generator.

The generator is located in the same room as the fuel-fired boilers and takes up a floor space of approximately six by ten feet, with a 24-foot headroom for the pump, shell and primary switchboard panel. The unit is operated by the same crew operating the fuel-fired boilers, no increase in boiler room force being necessary.

Gibbs-Brower Co., 261 Broadway, New York City, will occupy Booth 61.

B. F. Goodrich Rubber Mfg. Co., Akron, Ohio, will have a number of their prominent sales engineers in attendance at their booth. The feature of this exhibit will be three new rubber products for the paper industries of almost sensational interest:

Goodrich "Cutless" bearing, actually in operation, running with no lubrication except a mixture of water and sharp sand.

A "High Speed News" press roll, temporarily removed from service, after nine months' operation with no signs of corrugation. Visitors will have an opportunity to make Plastometer tests of the extremely soft rubber covering.

The new "1788" transmission belt recently developed by the Goodrich Company to contend with extreme drive conditions in pulp and paper mills.

Hammermill Paper Co., Erie, Pa., will occupy Booths 52-3 and will have on display views illustrating the paper making process of Hammermill, the scope of their lines and some of the conversions that indicate the wide adaptability of Hammermill paper to business usage.

William A. Hardy & Sons Co., Fitchburg, Mass., will occupy Booth 25, which will be in charge of John A. Murray and the master mechanic, Mr. Alfred C. Anderson. They will exhibit a complete line of their newest designs in Blow-Off "Y," Globe and Swing Check Valves for special use in digester equipment in sulphite mills—also their various types of bronze and copper screen plates.

Hercules Powder Co., Wilmingtown, Del., will occupy Booth 37.

Hoe Corporation, Poughkeepsie, N. Y., will occupy Booth 86. The main item that they will show will be a new type of wrench which is particularly suitable for heavy pipe work such as is found in paper and pulp mills.

P. P. Kellogg & Co., Springfield, Mass., will occupy Booth 52.

Keystone Lubricating Company, Philadelphia, Pa., will occupy Booth 81 and will be in charge of Mr. Buzby, the president of this company, as well as Messrs. Street, Norstrum and Lowry. They will have on display a Keystone manifold safety lubricator, a system of multiple feed high pressure grease which has been promoted very extensively the last year and the line of Keystone Keyso high point greases, besides their other regular line.

Kleen Products, Inc., North Wales, Pa.

Leather Belting Exchange, Forrest Bldg., Philadelphia, Pa., will occupy Booth 74-5 and will endeavor to show the advantages of leather belting for paper and pulp manufacturers.

Locke Regulator Co., Salem, Mass., will occupy Booth 28, and will have a complete line of regulators as manufactured by this company.

Lubriko Co., Meadow & Jackson Sts., Philadelphia, Pa., will occupy Booth 95A.

McGrath-Sherrill Press, 270 Congress St., Boston, Mass., will occupy Booth 56.

Mathieson-Alkali Works, 25 W. 43rd St., New York City, will occupy Booth 41, with an interesting exhibit for their line of liquid bleach and other chemicals used by the paper manufacturers.

Mid-West Air Filters, Inc., 100 E. 45th St., New York City, will occupy Booth 28.

The Mayer Coating Machines Co., 49 Chestnut St., Rochester, N. Y., will exhibit their coating machines that are suitable for the industry.

Nash Engineering Co., South Norwalk, Conn., will occupy Booth 42 and will exhibit their Hyton line of vacuum pumps.

National Aniline & Chemical Co., 40 Rector St., New York City, will occupy Booth 8A and will exhibit a full line of chemicals and colors as applied to the paper industry.

New Contributions to the Advancement of the Paper Industry

By THE B. F. GOODRICH RUBBER COMPANY

THE collaboration and interchange of knowledge between two industries is a short cut to achievement for both.

We make no claim to expert knowledge of paper-making, but of rubber and its possibilities, Goodrich is constantly discovering new things. Through contact and the intimate exchange of ideas with expert minds in your industry, we have been able to apply the latest advancements in rubber manufacture to the practical benefit of paper-making.

In this article are briefly described certain of these newest applications of rubber, by which paper manufacturers may obtain a better quality product by quicker and more economical means.

The Cutless Bearing

That a compound of rubber should be used for machine bearings is almost incredible to one not aware of the strides taken by rubber chemistry during recent years.

Yet the Goodrich "Cutless" Bearing, after four years of tests and actual use, has been proved, beyond any question, a successful solution of bearing troubles, wherever water is available to supply the necessary lubrication. Its success as a pump bearing has been so pronounced as to lead to its adoption by such manufacturers as the Worthington Pump and Machinery Corporation, the Krogh Pump and Machinery Company, and the Chicago Pump Company.

The inner surface of the "Cutless" Bearing is a rubber compound known as "Olivite," which resists wear with much more durability than metal. In this surface is molded a helical groove to carry water for lubrication and cooling. Solid particles roll across into this groove and are flushed away,—in fact "Cutless" bearings have been used in water containing 25 percent of sand, without scoring either journal or bearing surfaces. Another surprising characteristic of Olivite rubber surface is that its coefficient of friction under water lubrication is lower than that of an oiled babbitted surface.

The "Cutless" Bearing is close-fitting, and firm enough to stand tremendous pressures, but at the same time has enough "give" to absorb vibration and shocks, and misalignment of shafts. In some installations it permits the use of cold rolled shafting at a considerable saving in machining expense.

The abundance of water in the pulp and paper mill makes it a field to which the "Cutless" Bearing is particularly adaptable. The water, instead of washing away the oil and allowing the journals to burn out, is itself the lubricant. Lubrication is automatic and practically free from exposure. Most important of all, the risk of damage to machine clothing and sheet from grease and oil is eliminated. Life of wire and felts is increased and interruptions to operation reduced.

The "Cutless" Bearing is particularly adapted to screens, filters, pumps, cylinder molds, beater rolls, carrier roll, breast rolls, whippers, tube rolls, couch rolls, save-alls, and press rolls, i. e., practically every bearing preceding the dry end of the paper machine.

The standard and stock "Cutless" bearings are of plain cylindrical type, but special designs can be furnished to specifications. Considering the many economies made possible by their use, they are not expensive. Installation is easy, usually requiring no change in design of journals or mountings.

"1788" Belt

There are certain types of drives, more or less peculiar to paper-making, which consume belts so rapidly as to present a constant problem to the mill superintendent. Many of these drives are admittedly unsound from the standpoint of general engineering practice, but are accepted as the lesser of the two evils due to certain conditions of installation which cannot be eliminated. Any improvement in belt construction which increases to any degree the resistance to such conditions offers the possibility of new economies that may run into very considerable figures.

Lateral stiffness and ability to hold fasteners, as well as the normally required longitudinal strength and flexibility, are recognized as factors of primary importance in meeting these conditions. Experimental work for the past fifteen years has tried to combine these qualities in a belt. Specially woven ducks, which had all these features, would not combine with rubber friction well enough to bind the plies together securely. Friction compounds were later developed and the method of adhesion, but at a greatly increased cost, and a possible sacrifice in the aging qualities.

It was not until last year that the Goodrich Company was able to work out a complete belt, combining this much desired lateral stiffness, extremely strong fastener grip, longitudinal strength, freedom from stretch, flexibility, first-class adhesion, and long aging rubber friction, at a cost well within any previous attainment.

The resulting product is Goodrich "1788" Transmission Belt. It is recommended to the paper-maker to supplement his use of standard belts. It has been submitted to a thorough try-out in a number of mills and the results have exceeded our own expectations. In offering Goodrich "1788" to the trade, we feel that it is worthy to go in company with Goodrich "Cutless" Bearings and "High Speed News" Rubber Press Rolls.

The following summaries of reports from seven different mills indicate how successful these trials of "1788" belt have been:

"After 15 months, a 1788 Belt 8-inch, 7-ply, on 40 H. P. motor drive, 2,500 R. P. M., operating a grinder, still doing good work. Only one take-up. Previous service three months."

"1788 has shown several months' service on drives where belts previously used did not average more than a few weeks."

(Goodrich Advertisement)

"Endless 1788 belt 24-inch, 9-ply, operating on overloaded motor drive, 24-inch pulley, is apparently just as tight as when put on. **The take-up has never been touched.** Every type of belt has been used on this drive and in every other case it had been necessary to take up nine inches after two months."

"Superintendent has just received report on belting performance for the last six months of 1923, showing that 1788 has made a better record than belts of another make, which up to that time had been record-breakers."

"High Speed News," "News" and "Kraft" Press Roll Coverings

How great a stride is represented by the soft press roll coverings recently introduced by Goodrich is better appreciated by an understanding of some of the problems heretofore involved in covering iron rolls with rubber.

Because of its elasticity, ordinary soft rubber does not have a strong adhesion to metal. This difficulty has been satisfactorily overcome by using a layer of hard rubber next to the roll core. Hard rubber, or vulcanite, as it is sometimes called, is rubber containing a high percentage of sulphur, which, when heated for a considerable length of time, becomes rigid and comparatively inelastic. It has a coefficient of contraction considerably greater than that of iron, so that when it is cured over the grooved core of a press roll it fits tightly, with satisfactory adhesion. A soft rubber cover, placed over this base and vulcanized at the same time, will anchor itself firmly to the hard rubber.

However, the necessity for a long time of "cure" to properly vulcanize the hard rubber base so that proper adhesion to the metal could be obtained, has worked against the soft rubber compound of the cover, because the time of vulcanization of soft rubber is much shorter than that required for hard rubber, with the result that the amount of life and strength in the cover stock was greatly reduced from the maximum desired. The result was a cover which did not have resiliency and strength to undergo severe distortion without corrugating quickly. To overcome distortion, hard stocks were used that would not flatten out under the working pressure. As a result of using rubber covers which were comparatively hard, with only a small amount of "give," much of the desired cushioning effect was lost, resulting in felt marks, shortened felt life and insufficient resiliency to take up inequalities and insure even pressure across the sheet.

New developments in the chemistry of rubber have enabled Goodrich to bring about proper vulcanization to the hard rubber base, and also to develop a soft rubber cover which retains the maximum toughness and resiliency. As a result of these developments, we were able to produce a complete press roll embodying all of the desired characteristics. This has been done and is obtainable in three grades—"High Speed News," "News," and "Kraft."

The press roll on exhibition in the Goodrich booth at the 1924 Paper Industries Show was covered with "High Speed News" and has been in continuous service for nine months. During this time more than 100 million lineal feet of bond paper was produced —Speed 400-450 feet per minute. The surface has never corrugated and the roll will be put back into service after the exposition without regrinding. Accurate records show that it was the means of realizing a 25 per cent increase of felt life, and that the water removed was equal to that taken out with harder rolls testing 45-55.

Other Rubber Goods for Pulp and Paper Mills

Commander Belt: A standard of excellence for general paper mill transmission, known as the "gum cushion" belt, because of the layer of rubber inserted under the outside ply, insulating the body of the belt from wet, heat fumes and wear.

Maxecon conveyor belting for coal, lapped pulp and wood chips.

Elevator Belting.

Pulley lagging.

Commander Screen Diaphragms: Brown cover of tenacious elastic rubber; does not chip off or pit. Light in weight and flexible. Easy to install.

Goodrich Fourdrinier Aprons. Refinements in manufacture insure lying flat and secure attachment to supports. The only type of apron which may be depended on to retain a perfect smoothness of surface, offering no obstructions, wrinkles or blemishes to interfere with a uniform flow of stock. Does not crack or harden. Edges do not fray. Thickness $\frac{3}{64}$".

Super-Press, high density press roll coverings.

Rubber covered Felt Carrier and Worm Rolls—Economical in service as well as in first cost.

Couch Rolls for Fourdrinier and Cylinder machines.

Rubber Covered Breast Rolls, gumming rolls, inking rolls, sizing rolls, smooth rolls, squeezing rolls, waxing rolls, wringer rolls.

"Brown" Water Hose. Distinguished by its tough brown cover. Outside ply reinforcement is a seamless braided fabric which cannot unwind and holds cover securely. Inside plies are wrapped—smooth water-way. A hose of extraordinary durability for paper machine wash-up, bearings, grinders and blow-pits.

Goodrich Steam Hose. The first successful steam hose and still the leader. The tube is unusual in its resistance to heat.

Commander Air Hose. Light and flexible, kinking or twisting does not stop flow of air. Extremely durable cover.

Acid hose, boiler wash-out hose, chemical hose, oil hose, oxy-acetylene welding hose, suction hose, vacuum hose, tubing.

Rubber lining for Ball Mills. A new development in rubber. Three times more durable than metal linings.

Fire Protection Hose.
"Superheat" Asbestos sheet packing.
Akron Red Sheet Packing.
Hard Rubber Doctor Blades.
Pump valves, valve balls.
"High Duty" discs for Globe Valves.

Cutless Bearings, 1788 Belt, High Speed News, and other Goodrich goods for the pulp and paper industry will be exhibited in Booth 44A at the Paper Industries Exhibition in Grand Central Palace, New York, April 7-12.

(Goodrich Advertisement)

Nash Hytor

The VACUUM PUMP FOR SUCTION ROLL *and* FLAT BOX SERVICE

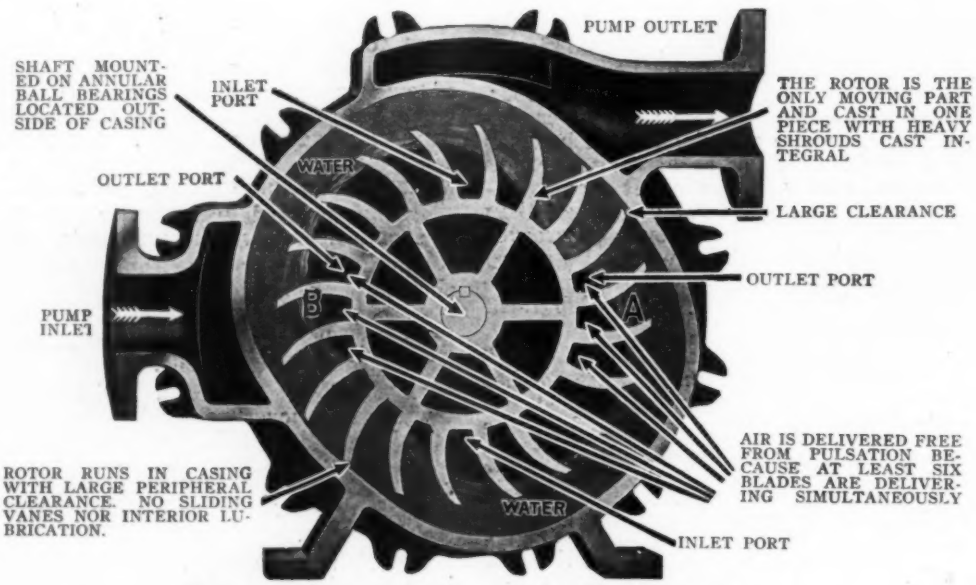

PUMP OUTLET
SHAFT MOUNTED ON ANNULAR BALL BEARINGS LOCATED OUTSIDE OF CASING
INLET PORT
THE ROTOR IS THE ONLY MOVING PART AND CAST IN ONE PIECE WITH HEAVY SHROUDS CAST INTEGRAL
WATER
OUTLET PORT
LARGE CLEARANCE
OUTLET PORT
PUMP INLET
B
A
AIR IS DELIVERED FREE FROM PULSATION BECAUSE AT LEAST SIX BLADES ARE DELIVERING SIMULTANEOUSLY
ROTOR RUNS IN CASING WITH LARGE PERIPHERAL CLEARANCE. NO SLIDING VANES NOR INTERIOR LUBRICATION.
WATER
INLET PORT

Diagram illustrating unique principle of operation

Vacuum Produced Absolutely Without Pulsation. No Vibration. Saves Wires. Only One Moving Part. No Rods, Pistons, Crank Shafts, Loose Moving Parts and No Gears. No Expert Attendance.

Nash Engineering Company

Wilson Point Road, South Norwalk, Connecticut

Western Representative
T. H. SAVERY, JR.
1718 Republic Bldg.,
Chicago, Ill.

New England Representative
G. H. GLEASON
185 Devonshire St.,
Boston, Mass.

National City Paper Corp., 72 Duane St., New York City, will occupy Booth 84.

Norma Company of America, Long Island City, New York, will occupy Booth 31 and will exhibit their line of roller and ball bearings suitable for paper mill machinery.

Oliver Continuous Filter Co., 33 W. 42nd St., New York City, will occupy Booth 5 and will exhibit their line of Oliver filtering appliances as suitable for paper and pulp mills.

Paper, 1478 Broadway, New York City.

Paper Industry, The, 356 Monadnock Bldg., Chicago, Ill.

Paper Makers Chemical Company, of Holyoke, Mass., and the **Western Paper Makers Chemical Company**, of Kalamazoo, Mich., will occupy Booths 18, 19 and 20. This company is

Dard Hunter

Courtesy of DARD HUNTER

The Sizing of Paper in the Seventeenth Century. From the Dutch Edition of "Art de faire Le Papier," by De La Lande

making plans for a most interesting exhibit and has been fortunate in retaining that artist and master craftsman, Dard Hunter, the master papermaker and producer of the only edition of a one man book extant, "Old Papermaking."

This will be an intensely educational, comprehensive, interesting exhibit of more than usual merit, to both master papermakers and laymen. The public will have a rare opportunity to see the actual making of hand-made paper and secure samples from the watermarked mold of Dard Hunter. It is safe to predict that Booths 18 and 19 will be one of the centers of attraction during the entire week.

Reproductions of antique papermaking appliances will be used entirely to produce this paper. The reproductions being made from etchings appearing in Old Papermaking. The entire equipment will, as near as possible, show the workings of a paper mill of centuries long past. This, the forerunner of the modern mill.

Special interest is everywhere apparent nowadays in this supposedly lost art, the making of hand-made paper, the revival of which must be credited to the research and energy extending over a period of years, searching the realms of the ancients and the archives of Europe by Dard Hunter.

This company has a number of particularly good items for paper mills, first of which is their Superior rosin size, and will show samples of their products in a multiplicity of attractive forms with a view of showing the cleanliness and other high grade qualities of their products.

Paper Mill & Wood Pulp News, 154 Nassau St., New York City.

Paper Trade Journal, 10 E. 39th St., New York City.

Pennsylvania Salt Mfg. Co., Widener Bldg., Philadelphia, Pa., will have Booth 36 and will display their line of bleaching powders.

The Permutit Company, 440 Fourth Ave., New York City, will occupy the West Half of booth No. 43. The principal and most interesting exhibit of the company will be a small size Permutit Water Softener. The Permutit apparatus occupies very little space in the plant and its simple operation does not require a skilled mechanic to handle. The absolute freedom from boiler scale is guaranteed, all impurities are removed from the water, thus making it ideal for paper mill purposes. Many of the largest paper mills in the country operate on Permutized Water.

The Permutit Company are the largest exclusive manufacturers in the world of all types of equipment for treating water to render it pure, soft and correct for all manufacturing purposes.

The exhibit will be attended by A. T. Smith, R. W. Epple, D. J. Saunders and A. F. McConnell of the New York office.

Potdevin Machine Co., 1221 38th St., Brooklyn, in Booth 28, will operate a sheet coating machine for applying glue, paste, wax and other compositions to paper or cardboard sheets and a recently perfected machine making and printing paper bags in two colors. Postage stamp bags, made on the latter machine at the rate of 100,000 daily will be distributed to visitors. Photographs and specifications of paper waxing and paper converting machinery built to special order will also be shown.

The booth will be in charge of Mr. Walter V. Hunter, assistant to the President and Mr. Charles Schaefer, manager of the Cumming Machine Department.

Pulp & Paper Magazine of Canada, Gardenvale, P. Q., Canada.

The Purity Paper Vessels Company, of Baltimore, Md., will occupy Booth 65.

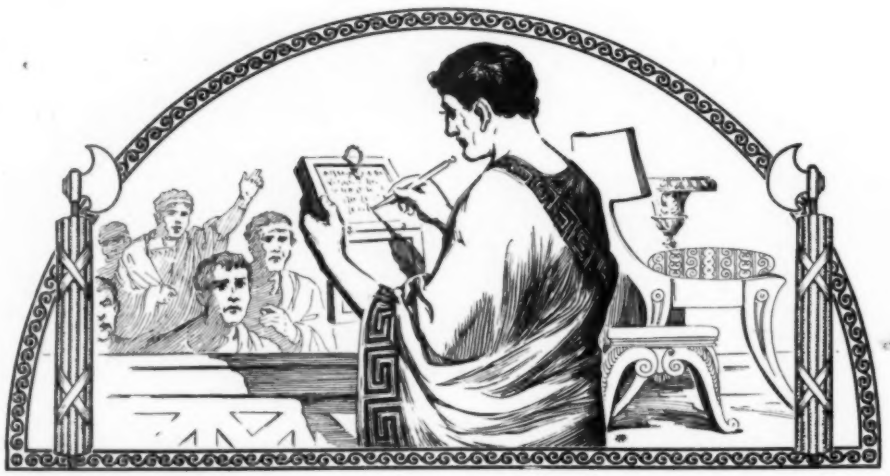
The exhibit will consist of Purity Paper Cans showing the many sizes manufactured and various uses to which they have been put, together with Pavesco Paper Bottles, which were designed entirely for use by the dairy trade.

The exhibit will be in actual charge of Mr. Allyn G. Whitehead, supervisor of sales in the Eastern District and he will be assisted by Mr. John A. Owen, Jr., and Mr. Wm. A. Palmer, supervisor of sales in the metropolitan district. Mr. W. R. Lenderking, vice-president and general manager, will also be in attendance during the entire time of the exposition.

The company will show many appliances which have been designed to assist the ice cream manufacturers as well as other branches of industry in handling various food products.

Reed Air Filter Co., Louisville, Ky., will occupy Booth 93, and one of the features of their exhibit will be a complete miniature ventilation system with all the gauges and instruments for determining air flow, resistance and cleaning efficiency. Besides this they will have a full size filter of some sixteen units, showing the simplicity of erecting and installing the Reed Air Filter. Mr. H. C. Murphy and Mr. C. P. Hegan will be in charge of the exhibit.

Sandusky Foundry & Machine Co., Sandusky, Ohio, will occupy Booths 60, 72 and 73. Their exhibit will consist of one or more 26-inch diameter drilled shells for Millspaugh Suction Couch Rolls. They will also possibly have shells showing press drilling and also may have Millspaugh shower pipes and foam sprays as well as patented suction slice pipes. This company will exhibit something absolutely new in the shape of their cycloidal vacuum pumps which they are just



But Caesar had no Printing Press

Julius Caesar built up a vast dominion by the force of his own personality. When Caesar was gone the empire crumbled. The different parts had no common ground of thought to hold them together.

Lack of communication was a serious handicap in ancient times. Word-of-mouth messages get to their destination slowly and inaccurately. A growing world consciousness depends upon an easy and accurate diffusion of information.

Printed sheets of paper brought men out of the Dark Ages into our modern civilization. The printed page has the power to move minds, a hundred or a million at a time.

To make the printed page broadly available is in large part a responsibility of the modern paper maker.

Hammermill Paper Company
Erie, Pennsylvania

MODERN business development demands paper. Without paper—*abundant, varied, low-cost paper*—the great economic machine would soon have to shut down. To get paper in such volume and variety, we go back to the Forest. UNION BAG & PAPER CORPORATION does this literally—as you can see by attending

PAPER INDUSTRIES EXPOSITION
GRAND CENTRAL PALACE, NEW YORK
WEEK of APRIL 7th · Booths Nos. 54 and 55

The Union exhibit—larger and more graphic than last year—will follow the path from Forest to Consumer. Logs, Lumber, Pulp, Paper and Paper Bags mark the various stages of converting spruce trees into wrappings and containers.

Of course the last stage—the Paper Bag—is the most interesting. Even those who are in a general way familiar with the paper industry will find themselves in a "new" field here. Union "Odd and Special" Bags, for instance, have found a thousand and one places to serve effectively, neatly, economically. Many of them are so refined (as to materials, formation and decoration) that they can hardly be recognized as "paper bags."

By all means see this annual Exposition. It is giving the public a new idea of the importance and development of your industry. And be sure that a welcome is waiting for you at the Union stand.

UNION BAG & PAPER CORPORATION
AND ASSOCIATED COMPANIES AND BRANCHES
Manufacturers of Lumber, Pulp, Newsprint, Wrapping Paper, Paper Bags and Paper Sacks
GENERAL OFFICES ▪ WOOLWORTH BUILDING ▪ NEW YORK CITY

TRADE MARK UNION

WE ARE GLAD TO BE KNOWN BY THE COMPANY WE KEEP

REPEAT ORDERS OUR BEST RECOMMENDATION

Twenty mills placed 2 orders in 1923. Eight mills placed 3 orders. Three mills placed 4 contracts. Two mills gave us 6 repeat orders and two mills gave us 8 separate repeat orders in 1923 alone.

LET US TAKE CARE OF YOUR HEATING & VENTILATING PROBLEMS

SOME OF OUR CUSTOMERS FOR 1923 ONLY

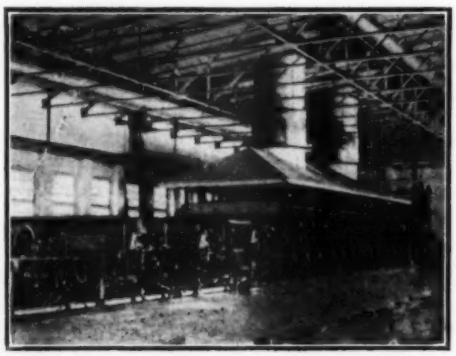
*Acme Paper Company
*American Coating Mills
*American Photo Products Co.
*American Writing Paper Co.
Backus-Brooks Company
Bagley & Sewall
Bathurst Company, Limited
*Becker Smith & Page, Inc.
Beckwith Manufacturing Co.
*Bird & Sons, Inc.
Bogalusa Paper Co., Inc.
Bog. N. Boxer Co., Limited
J. F. Boyle Company
L. L. Brown Company
*Byron Weston Co.
*Campbell Wall Paper Co.
Central Paper Co.
Certain-teed Products Co.
Champion Coated Paper Co.
Chicago Coated Board Co.
Chicago Varnished, The, Co.
Cincinnati Paper Board Co.
Colin Gardner Paper Co.
*Cushaoo Paper Co.
*DeGrasse Paper Company
*Dennison Manufacturing Co.
Donnacona Paper Company, Limited
*Dryden Paper Company, Limited
Eddy Paper Corporation
Everett Pulp & Paper Co.
Falulah Paper Company
*Federal Paper Board Company, Inc.
Fillmore & Slade
*Fort Orange Paper Company
Fox River Paper Company
Robert Gair Company
Gardner-Harvey Paper Company
*Gilbert Paper Company
P. H. Glatfelter Company
Great Lakes Paper Company, Limited
*Great Northern Paper Company
*Robert Griffin Company
Haloid Company
Hammond Bag & Paper Company
Hollingsworth & Whitney Company
Illinois Varnished Tile Company
*Imperial Wall Paper Company
*International Paper Company
Joliet Wall Paper Company
Kimberly-Clark Company
E. M. Kratz
Kupfer Brothers Company
Laurentide Company, Limited
MacAndrews & Forbes Company
John A. Manning Paper Co., Inc.
Marinette & Menominee Paper Co.
Mattagami Pulp & Paper Co., Ltd.
Mead Fibre Company
Nashwaak Pulp & Paper Co., Ltd.
National Biscuit Company
National Fiber Textile Company
National Folding Box Company
Nekoosa-Edwards Paper Co., Inc.
New Jersey Coated Paper Company
*New York & Pennsylvania Company
Ohio Box Board Company
Oregon Pulp & Paper Company
Oxford Paper Company
Paraffine Companies Inc.
*Paterson Parchment Paper Co.
*Peshtigo Paper Co.
Plattsburgh Wall Paper Company
Price Brothers & Co., Limited
Reliance Mill & Trading Company
*River Raisin Paper Company
Riverside Fibre & Paper Company
Rogers Paper Manufacturing Co., Inc.
A. Sanderson & Sons
Saranac Pulp & Paper Company
Schmidt & Ault Paper Company
*Sears Roebuck & Company
Southern Paper Company
Spaulding Fibre Company
Tileston & Hollingsworth Co.
*The Tissue Company
Uncas Paper Board Company
*Underwood Paper Mills, Inc.
Upson Company
*Viscose Company
Waldorf Paper Products Co.
John Waldron Company
Wausau Sulphate Fibre Co.
Wayagamack Pulp & Paper Co., Ltd.
*West Virginia Pulp & Paper Co.
Whiting-Plover Paper Company
Windsor Locks Paper Mills Co.
York Card & Paper Company

*Shows mills that also placed contracts with us in 1922.

BRINER ECONOMIZERS

MACHINE ROOM VENTILATION

VAPOR ABSORPTION SYSTEMS



UNIT HEATERS

FANS

AIR DRYING

AIR CONDITIONING

"ROSS" SYSTEM, OXFORD PAPER CO., RUMFORD, ME.

J. O. ROSS ENGINEERING CORPORATION

Main Office: 30 E. 42nd St., New York City

Branches: 549 W. Washington Blvd., Chicago, Ill.: J. L. Williamson, Mgr., 79 Milk Street, Boston, Mass.: F. W. Partsch, Mgr., 1117 Tacoma Avenue, Tacoma, Washington

ROSS ENGINEERING OF CANADA, LIMITED

New Birks Building
MONTREAL

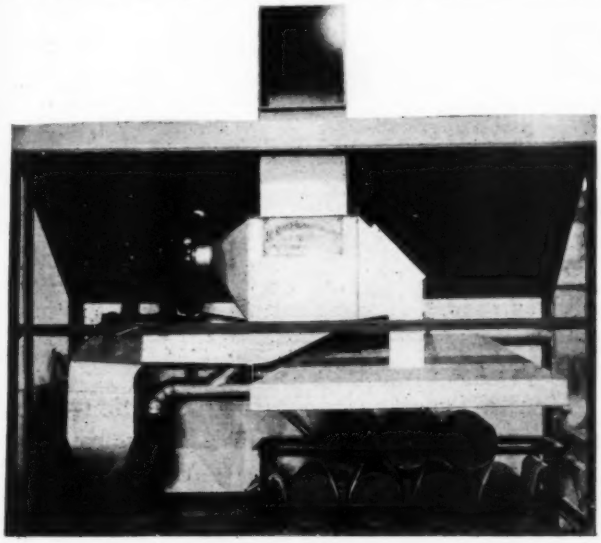
JOHN WALDRON CORPORATION

New Brunswick, NEW JERSEY

now putting on the market and is of a new design as well as special fittings.

Fluid compressed brass, bronze and copper tubes will also be on display. They will also exhibit cast copper as well as brass and bronze rolls and some unique samples of thin wall tubing made by their special process. Another feature of this exhibit will be a cast iron winder drum mounted on roll ball-bearings which they expect to have in action hooked up to an electric motor. This will show their anti-friction roll ball-bearings for rolls and dryers.

J. O. Ross Engineering Corp., 30 E. 42nd St., New York City, will have a working model of the Briner economizer in connection with vapor absorption systems on paper machines.



Working Model of Briner Economizer

They will also exhibit photographs and descriptions of the various heating and ventilating work which this company does for paper and pulp mills. There will also be on exhibit photographs and descriptions of machinery manufactured by the John Waldron Corp., New Brunswick, the sales of which company the Ross Engineering Company now takes care of. Mr. A. B. Clark, secretary of the company, and others will be in attendance. They will occupy Booth 94.

SKF Indstries, 165 Broadway, New York City, will occupy Booth 17, showing a range of Skayef self-aligning and Hess-Bright ball-bearings will be shown, also step operation of ball-bearings and Atlas steel balls.

Ball-bearing housings for table rolls, dryer felt rolls and Fourdrinier wire and press felt rolls will be shown, also a large Skayef self-aligning ball and spherical roller bearing.

Interesting models showing the anti-friction qualities of ball-bearings will instruct and amuse while engineers will be on hand to answer questions about the application of ball and roller bearings to paper machinery.

The following men will be present: R. H. De Mott, general sales manager; H. E. Brunner, chief engineer; G. H. Spencer, pulp and paper department; J. C. Gayler, pulp and paper department; R. C. Byler, advertising manager.

Sealright Co., Inc., Fulton, N. Y., will occupy Booth 44B.

Seminole Chemical Co., 75 Beasey street, New York City, will occupy Booth 85.

Shepherd Electric Crane & Hoist Co., Montour Falls, N. Y., will illustrate and describe the various kinds of overhead carrying devices as manufactured by this company.

Seaboard Airline Railway, Savannah, Ga., will have one of the interesting exhibitions of the exposition which is described in another column in this form.

Taylor-Wharton Iron & Steel Co., High Bridge, N. J., will occupy Booth 59, showing their cast Jordan linings, beater rolls and other appliances for paper and pulp mills.

The W. S. Tyler Co., Cleveland, Ohio, will occupy Booth 33, with an interesting exhibit showing their manufacture of all types of paper machine wires and bronze castings.

Tidewater Oil Sales Corp., 11 Broadway, New York City, will occupy Booth 98 and will display various kinds of lubricating oils and greases as suitable for the industry.

Union Bag & Paper Corp., 233 Broadway, New York City, will occupy Booths 54-5.

They are planning to make their exhibit a complete indication of the work of all the manufacturing units under their control. This will include St. Maurice Paper Co., Ltd., as well as Union Bag & Paper Corporation. This will also include the selling companies as well, viz., St. Maurice Sales Co., Ltd., who are sole distributors for St. Maurice Paper Co. and sole agents for St. Lawrence Paper Mills, Limited; also the selling agents of Union Bag & Paper Corporation proper, which include: The Chatfield & Woods Co., Cincinnati, Ohio; Cupples Company, St. Louis and Chicago, Illinois; Hollingsworth & Whitney Co., Boston, Mass.; Union Bag & Paper Corporation (branch office), Drexel Building, Philadelphia, Pa.; D. S. Walton & Co., New York City; Wheeler, Fisher & Co., Chicago, Ill., and the Whitaker Paper Co., Baltimore, Md.

They are aiming to make this fully as comprehensive and graphic as last year. Literally, their operations (and therefore the exhibit) extend from woodland operations in their north woods and in Crown lands and freeholds in Canada, to the finished package in the hands of the retailer and consumer.

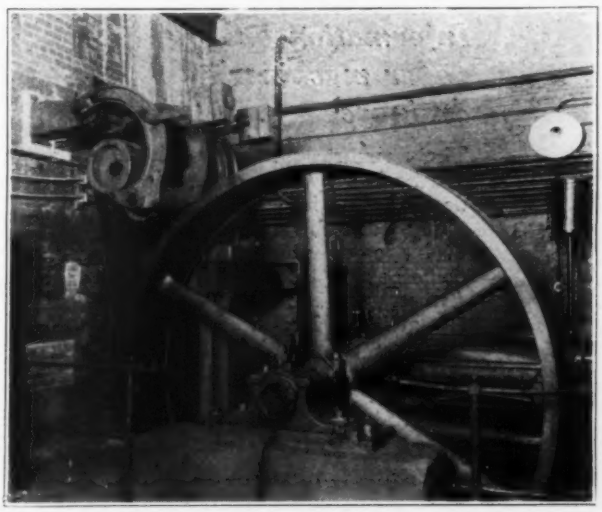
Thus this company will exhibit and discuss lumber, pulp, paper and paper bags. Their lumber resources (St. Maurice) include both rough and dressed soft woods and shingles. The pulp (St. Maurice and Union) includes groundwood, sulphite, Kraft and various grades of screenings. The paper includes St. Maurice and St. Lawrence newsprint and the Union grades of Kraft, dry-finish sulphite, screenings and mill wrapper, each under its own trademark.

When it comes to the bags, it is almost hopeless to attempt to cover the subject in anything like reasonables space. From the self-opening, square and flat grocery bag lines, manufacture and use have spread into a great many fields—fields which even trained paper men would hardly suspect, and in which many of the goods are so highly developed as hardly to be recognizable as paper bags.

This company is taking this second annual exposition of the industry quite seriously and planning to make the exhibit as effective as possible. The appropriation necessary for an appearance like this is somewhat out of proportion to its traceable value, but they believe that the industry in general needs at least one yearly public appearance of this kind, and have again voted to support it.

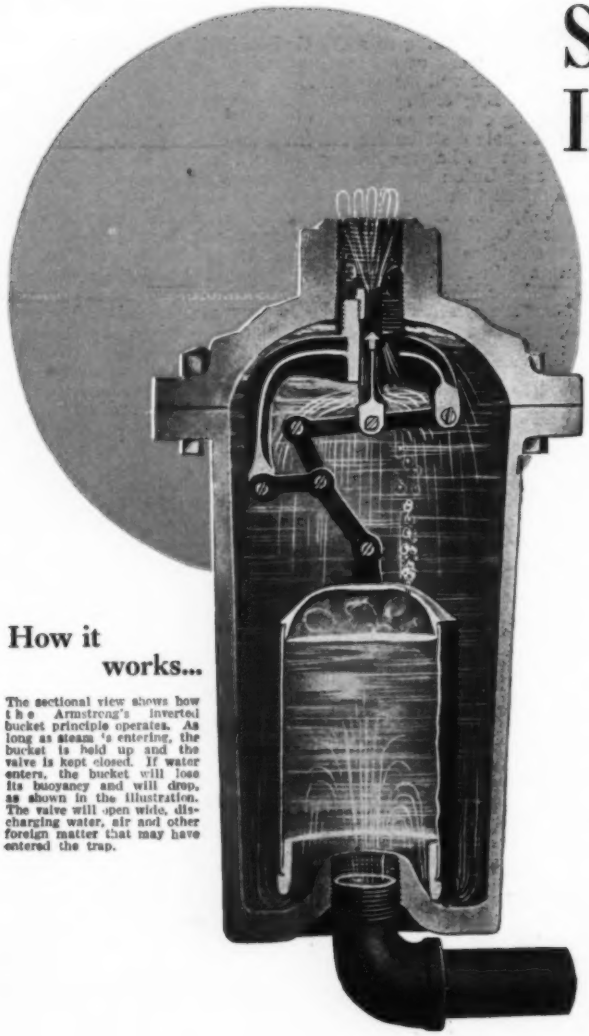
The personnel attending the booth will be under the immediate charge of Mr. Alexander Calder, general sales manager, and will include: Mr. H. S. Daniels, manager specialty sales; Mr. W. L. S. Alexander, assisting in specialty sales department; Messrs. H. W. Cressy and E. M. Gardner of St. Maurice Sales; Mr. W. C. Mansfield, manager Union Grocery Bag Sales, and Mr. E. J. Rose of the New York City sales group. The object in selecting the personnel is to give a complete range of specialists, from pulp through to fancy and special bag production. In other words, access to the crew in charge of the exhibit insures the best of information and counsel for any inquirer.

F. L. Smith & Co., 50 Church street, New York City, will occupy Booth 40, and will have on exhibition one of their well



known Lenix belt drives, a device which seems to be particularly suitable for paper and pulp mill work.

See It at the Paper Industries Exposition —booth 58



How it works...

The sectional view shows how the Armstrong's inverted bucket principle operates. As long as steam is entering, the bucket is held up and the valve is kept closed. If water enters, the bucket will lose its buoyancy and will drop, as shown in the illustration. The valve will open wide, discharging water, air and other foreign matter that may have entered the trap.

THE Armstrong Steam Trap will be right at home at the Paper Industries Exposition. Its service records are known throughout the industry—records so commendable that their fame has spread into other fields and popularized "the little trap of big capacity" wherever steam traps are used.

If you attend the exposition you will find a glass model of the Armstrong working under steam pressure and going through the entire cycle of operation.

You will see the quick, positive action—the self-scrubbing action—the positive closure preventing steam leakage—the effective way of discharging air and incondensible gases. You will see why this small, light, inexpensive trap has greater capacity than any trap of equal size.

If you do not expect to attend the Exposition, ask for a catalog that goes into detail. Use the coupon below to request it—or to ask for details of the Armstrong test offer as you prefer.

ARMSTRONG MACHINE WORKS
322 Steam Saving Street, Three Rivers, Mich.

Information on paper machine drainage

The Armstrong Machine Works has spent a great deal of time in intensive study of the efficient drainage of paper machine dryers. Call at the Armstrong booth (No. 52) and ask for information on application of steam traps to paper machines as individual units or as incorporated in complete drainage systems.

Armstrong Steam Trap

The Standard Armstrong Trap is furnished for pressure from 0 to 300 lbs.—for service on vacuum where pressure on the inlet is greater than on the outlet—for draining water from compressed air expansion tanks, separators, etc.—for service on grease. The Armstrong Special is for pulsating pressures and unusual conditions.

Send us ☐ The Armstrong Catalog. ☐ Details of test offer.

Firm .....

Address .....

Att'n .....

To Armstrong Machine Wks. 322 Steam Saving Street, Three Rivers, Mich.

PI 3-24

Display at Paper Show Booth No. 81

5 *things to fight*

in plant operation

Poor Lubrication
Loss of Life or Limb
Fire Hazards
Interrupted Production
Machine Depreciation

THE Keystone Manifold Safety Lubricator combats them all in new, efficient ways.

Send him back to them—*Safe*

"CLOSE shaves! Man! You do think of the home folks at times." Risks are demanded daily to lubricate properly certain bearings. Close clearances, hard-to-reach bearings take a toll—but let the figures tell the story.

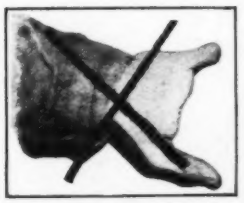
Think! 163 accidents in one industry alone last year were due to men being caught in machines while lubricating them, 2558 days of productive time was lost. Another industry reports 442 such accidents.

Loss of life! Loss of limb! Loss of profits!

This is no small matter to pass off lightly. Taking the hazards out of lubrication is vital to you, as it is to every other big industrial executive.

Obviously this costly toll will continue just as long as an operator visits each and every bearing individually, but this is no longer necessary, nor are the attending risks.

Thru the installation of the Keystone Manifold Safety Lubricator the operator stands in one safe place and, turning a wheel, lubricates the whole machine — positively — economically—*safely*.



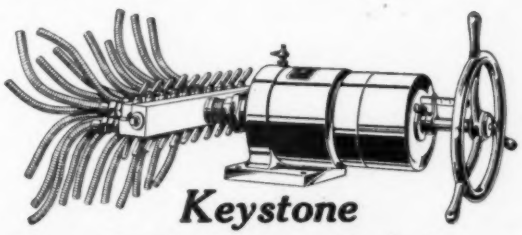
End this menace to life and limb

The Keystone Manifold Safety Lubricator presents a method of applying Keystone Grease under high pressure, with pipe line distribution, to more than one bearing.

No waste of grease; no risk to operator; no dirt in bearings; no shut-down for lubrication; no excuse for neglect.

Oust risk and you minimize neglect —friction's costly toll of power loss —wear—and premature scrapping of machinery.

Figure out just what this would mean to your operating schedule, your employees, your profits. Then write.



Keystone Manifold Safety Lubricator

MULTIPLE FEED, HIGH PRESSURE GREASE LUBRICATING SYSTEM

Different plants, operating under different conditions with different types of machinery, require different methods and forms of lubrication. All the knowledge of scientific plant-operation gathered by our lubrication engineers is at your disposal—a survey of the conditions in your plant and our recommendations will cost you nothing. Branches in every important city. Agencies throughout the world.

KEYSTONE GREASE

THE KEYSTONE LUBRICATING CO., *Est. 1884, Philadelphia*

Executive Office and Works: 21st and Clearfield Sts.

The initials of a friend

They mark—and guarantee the excellence of—electrical products manufactured by the General Electric Company, Schenectady, N. Y.

They will guide you to G-E Headquarters at the Convention, New York City, week of April 7, Space No. 16—Grand Central Palace.

There you will find a friendly, helpful and complete service to meet your needs for whatever electric equipment you may require.

At the Convention—Space No. 16—Grand Central Palace

43B-849

GENERAL ELECTRIC

U. S. Testing Co., Inc., 340 Hudson street, New York City, will occupy Booth 39.

Union Sulphur Co., 33 Rector street, New York City, will occupy Booth 38.

Valley Iron Works Co., Appleton, Wis., will occupy Booth 87. The main things which they will exhibit will be a Miniature Voith High Pressure Stock Inlet, a Miniature P. A. P. A. Pulp and Paper Screen, the Valley Size Tester, Niagara Type Laboratory Beater, as well as some of their other specialties. The Voith Stock Inlet, which will be shown in miniature, is a comparatively new device and is attracting considerable attention from paper manufacturers. No doubt many of them will be interested to see just how this device works. The booth will be in charge of Mr. W. H. Burns, sales manager and secretary of the company, and Mr. Harry Bennett, the eastern manager.

Voorhees Rubber Mfg. Co., Jersey City, N. J., will occupy Booth 88 and will have on exhibition their line of "Rubber Goods of Ultimate Economy" such as their Sensation Belt, Sensation Hose, and Rub Steel Valves.

Westfield River Paper Co., Inc., Russell, Mass., will occupy Booth 80 and will have on exhibition a line of their different Glassines, both plain and embossed and their specialties such as Celloglas and Silvercoated Paperglas. They will also have on display the many uses which Glassine is put to. The exhibition will be in charge of Mr. Albert Kyritz, Jr.

John Waldron Corp., New Brunswick, N. J., will occupy Booth 94 with the J. O. Ross Engineering Corp.

Westinghouse Electric & Mfg. Co., East Pittsburg, Pa., will occupy Booth 4.

This company will exhibit a sectional driving unit of their sectional paper machine drive. This will consist of a type SK motor coupled to a parallel shaft, single reduction gear, both of which will be mounted on a common bedplate with a chain-driven speed changer and rotary contactor; a master rotary contactor unit; a section control panel and a master control panel. This equipment will not be connected to any load but will be demonstrated in operation from start, fast, slow, stop, push bottons and speeds in terms of feet per minute of paper will be shown by an electric indicating device. In addition to this display there will be shown type Wk-10, WK-55, W-20 safety switches, a table of micarta products and some lamp reflectors suitable for paper mill illumination. Type X and type Y alternating current meters will also be displayed.

Those present will be: W. H. Artz, manager, paper mill section, industrial sales department, East Pittsburg; J. M. LaMontagne, New York office; W. J. Moore, New York office; A. D. McKerrow, Boston office; J. W. McGee, Philadelphia office; S. A. Staege, paper mill engineer, and W. W. Spratt, paper mill engineer.

William Bond Wheelwright, 270 Congress street, Boston, Mass., will occupy Booth 56, making an exhibition of sales ideas for the paper industry, featuring the work that he has done for the Albany Felt Co., Falulah Paper Co., District of Columbia Paper Mfg. Co., and the George W. Wheelwright Paper Co.

Anti-Friction Bearings in Paper Making Machinery*

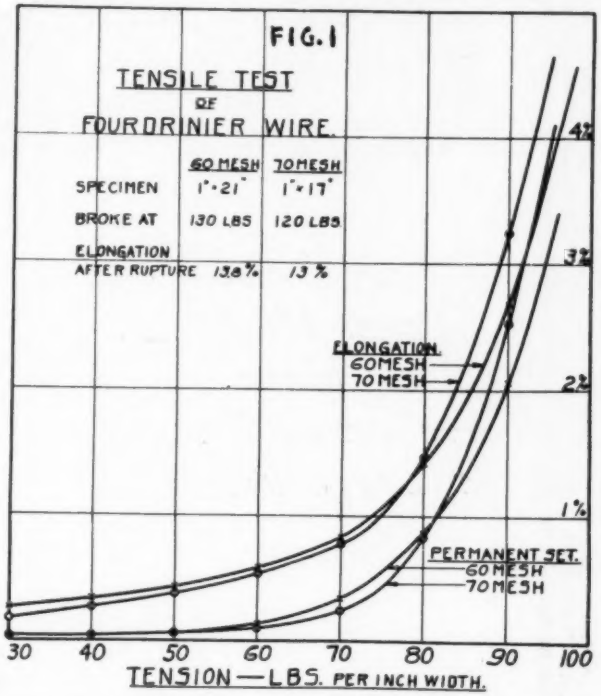
By R. H. De MOTT

General Sales Manager, SKF Industries, Inc.

THE reduction or elimination of friction in machines of various types presents perhaps the most fascinating of studies in all branches of enginering, not only because of any progress made in the science of engineering through this reduction of friction, but largely because of general improvements in machine operation and quality and quantity of machine output.

We have no record as to the date when it was first found that rolling friction was less than sliding friction; but there is very little doubt that this discovery was made when it was found that it was easier to roll than drag these bodies, which otherwise were difficult to move.

When our ancestors were tired of carrying burdens around in their arms and on their heads and backs, they pulled them around on the ground with vine rope. Then they either pushed or pulled the load on skids. The rollers used under a block of stone by the ancient Egyptians were a step from sliding to rolling friction. From the roller the wheel on chariots marks the first development of changing rolling friction between the ground and the weight to rubbing friction in an axle. This invention had the effect of concentrating the friction loss to a small and well defined area, namely, the wheel hub. Later it was found that if the surfaces in the hub where friction took place were properly prepared and treated, a large reduction in friction followed. Suffice it to



say that the development has always been towards reducing the friction and increasing the reliability of the bearings.

Perhaps the greatest advance in the fight against friction was made when the ball-bearing principle was discovered. Inventions relating to crude ball bearings are found in American patent papers from the years 1862 to 1870. Reliable principles for the design of such bearings were, however, not laid down, and the result was that the oldest ball bearings could not be adopted in practice and were of merely theoretical interest.

The first practical use to any large extent of the ball bearings was in connection with the development of the modern bicycle. The type used for this purpose was the cup and cone bearing. This bearing received its name from the fact that the balls roll between two surfaces, one of which has the shape of a cup and the other one of a cone.

During the past years a great deal of time and money has been spent upon engineering and research work covering proper materials for use in and proper design of anti-friction bearings, and through this development work it is possible to offer anti-friction bearings to manufacturers and users of machines which can be considered generally successful.

The application of ball bearings in the pulp and paper industry started in the United States some fifteen years ago, when bearings were applied to cylinder molds and couch rolls, and although definite records of the performance of these applications are not available, we do have knowledge of applications for ball bearings which have been running continuously for from seven to ten years.

Being limited in time for the discussion of this paper, we will endeavor to convey to you some idea of the advancement of this problem by taking up specific rolls of the papermaking machine and showing briefly what has been done in the past and what is being done at present, it being our positive feeling that the satisfactory performance of anti-friction bearings depends upon three essentials, namely, proper selection of bearing size, proper design and construction of bearing housing, and proper care and lubrication.

Breast Roll

During the year 1916 one of our American manufacturers built for one of our large newsprint mills a non-shaking high speed Fourdrinier machine, designed to run at 1000 feet

*Paper read before the meeting of the Technical Section of the Canadian Paper and Pulp Association, Montreal, January 23, 1924.

DOWNINGTOWN

Paper Machines Make Production Records in Large Felt Mill

This is part of a letter received by us, from one of the largest producers of roofing felt in this country.

"We have had in operation three of your paper machines manufacturing felt roofing paper, which have given us excellent service and high production."

"On our 82″ machine we average 45 tons daily; on our 86″ machine we averaged 50 tons daily, and on our 126″ machine an average of 70 tons per day."

"We have at times ran for three days and nights without having the paper off of the dryers and we think that it is quite a record."

(Note:—The 82″ and 86″ machines run on 72″ trim and the 126″ machine trims 108″ to 114″.)

Reports such as these are the rule, rather than the exception, from users of DOWNINGTOWN Machinery.

We have designed and built paper mill machinery exclusively, for more than 40 years.

Let us bid on your next requirements.

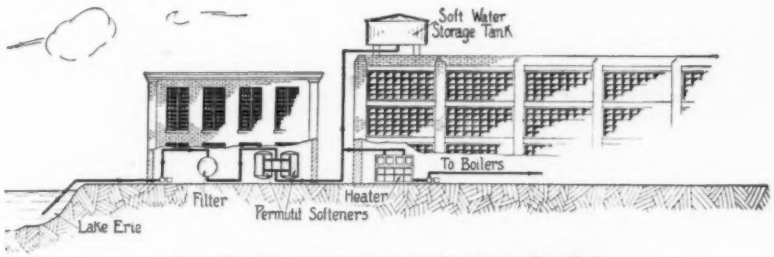
A Few DOWNINGTOWN *Products*

Fourdrinier Machines	Bandless Beater Rolls	Cutters	Pumps
Cylinder Machines	Washers	Slitters	Rolls
Beaters	Winders	Cylinder Moulds	Calenders

DOWNINGTOWN MANUFACTURING COMPANY

Paper and Pulp Mill Machinery

P. O. BOX 8, EAST DOWNINGTOWN, PA., U. S. A.



Flow diagram showing water supply system described

Not a Single Boiler Tube Replaced in 4800 H.P. Boiler Plant in Two Years

A large industrial corporation in Buffalo, N. Y., operates a boiler plant consisting of 6 Stirling, vertical water tube boilers that develop an average of 4800 H.P., 24 hours per day the year round.

The water supply used for boiler feed purposes is derived from Lake Erie, and besides having variable amounts of sludge and mud forming matter, contains an average of 8 grains of hardness per gallon.

Due to the steady demand for continuous service from these boilers, which are operated day and night without a letup, it is absolutely essential that they be free from scale, sludge and mud, as an interruption in service to replace or clean boiler tubes would be very costly.

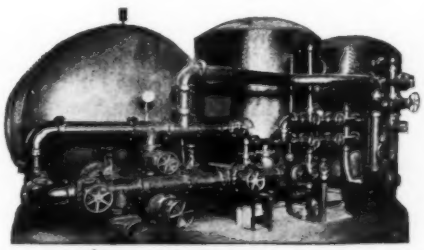
With this in mind a Permutit Zeolite water softening system was installed when the plant was built. It delivers 230,000 gallons of absolutely clean, zero soft water per day, and during the two years it has been in service it has completely prevented the formation of scale, sludge and mud in the boilers of their connections.

A letter from the vice-president of the corporation states in part:

> " . . . recently we opened a boiler after nine months' continuous service, and found no scale of any character in the tubes . . ."
> " . . . we have not as yet replaced a tube after one and one-half years of operation."

In this large boiler plant, operating at heavy loads day and night, there are no cleaning gangs employed, no boiler shut-downs, no tube replacements—and there have been none since the plant was built.

How about YOUR boiler plant? Let us solve your problems, too. Write for our valuable booklet today.



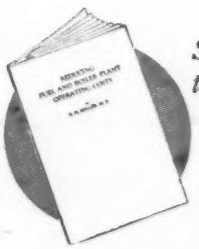
Photograph of Permutit water softening plant described above. Note small size and simplicity of the installation.

The Permutit Company
440 Fourth Ave. New York

For Your Protection

On June 15, 1921, the Federal Court at Buffalo (Hazel, J.) handed down a decision sustaining our patent covering zeolite water softening apparatus, and stating that this patent "is concededly not limited to any particular class of zeolitic material." The Court also described the apparatus held to infringe, and this description, our counsel advises, applies to all zeolite softeners on the market. Other suits brought by us for infringement are pending.

The above decision has been affirmed by the Circuit Court of Appeals, and the U. S. Supreme Court has denied a petition for a writ of Certiorari to review it.



Send for this free booklet

The Permutit Company
440 Fourth Ave.
New York

Please send me your free booklet, **"Reducing Fuel and Boiler Plant Operating Costs."**

Name .....

Address .....

Company .....

2149-31

Announcement

ON JANUARY 16th, 1924, the John Waldron Corporation was organized under the laws of the state of New Jersey to take over the entire business of the John Waldron Company with main offices and works at New Brunswick, N. J.

The past owners will retain a large interest in the new corporation. A large financial interest has been acquired by the J. O. Ross Engineering Corporation who are well known to the Paper Industry.

The sales and engineering of all products of the John Waldron Corporation, as well as their own products and systems, will be handled by the J. O. Ross Engineering Corporation and Ross Engineering of Canada, Limited. The only exception will be the sales of Francke Flexible Couplings which will be handled by Smith & Serrell as in the past.

The complete organizations and personnel of the John Waldron Company and the J. O. Ross Engineering Corporation are now available to you as one corporation.

The officers of the new John Waldron Corporation will be:

WM. H. WALDRON . . . . *President*
JOHN O. ROSS . . . . . *Vice Pres. and Gen. Mgr.*
CHAS. A. SECOR . . . . . *Vice Pres. and Secy.*
EDWARD A. WALDRON . . *Vice Pres. and Mgr.*
HERBERT M. WALDRON . *Treasurer*

WALDRON EQUIPMENT FOR

Coated, Gummed, Wall Abrasive and other Specialty Papers; Printing Machines for Paper, Rugs, Textile, Linoleum, and Oil Cloth; Hang-up Festoons, Reels, Winders, and Slitters; Paper Calender Rolls, Embossing and Crepeing Machines; Loft Paper Dryers.

ROSS ENGINEERING PRODUCTS

¶ BRINER Economizers, Drying Systems of all kinds, Air Conditioning, Vapor Absorption Systems, Machine Room Ventilation, Heating and Ventilating Systems for Paper and Pulp Mills.

FRANCKE FLEXIBLE COUPLINGS

JOHN WALDRON CORPORATION

Main Office and Works: New Brunswick, New Jersey

J. O. ROSS ENGINEERING CORPORATION

549 W. Washington Blvd. Chicago, Ill. | 30 E. 42nd St. New York City | 79 Milk Street Boston, Mass.

ROSS ENGINEERING *of* CANADA, *Ltd.*

New Birks Building, Montreal

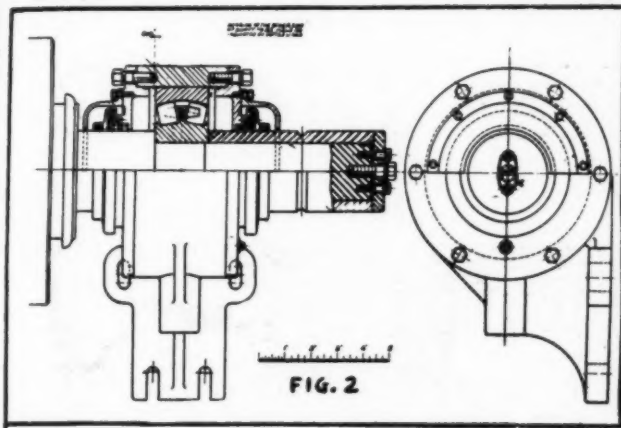
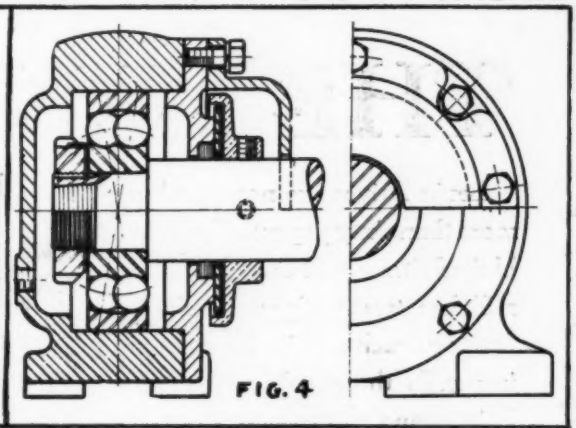


FIG. 2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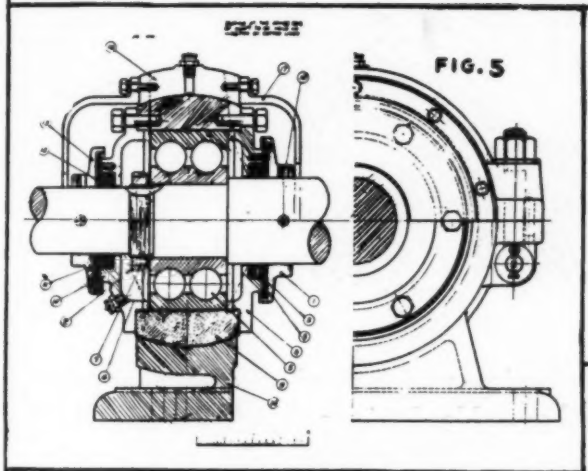
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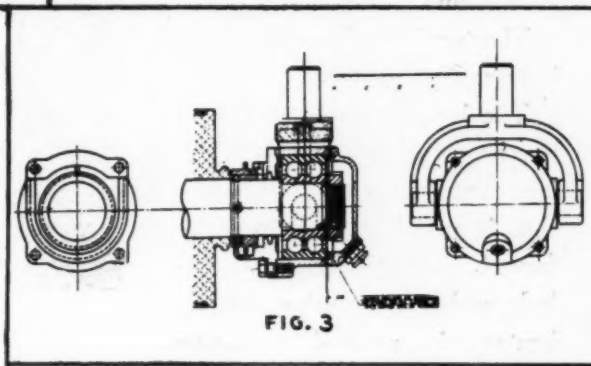


FIG. 3

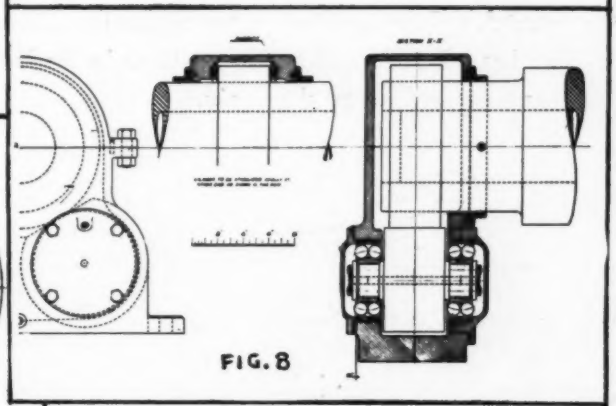


FIG. 8

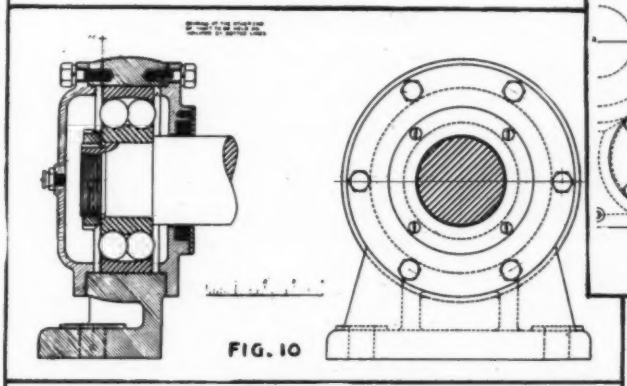


FIG. 10

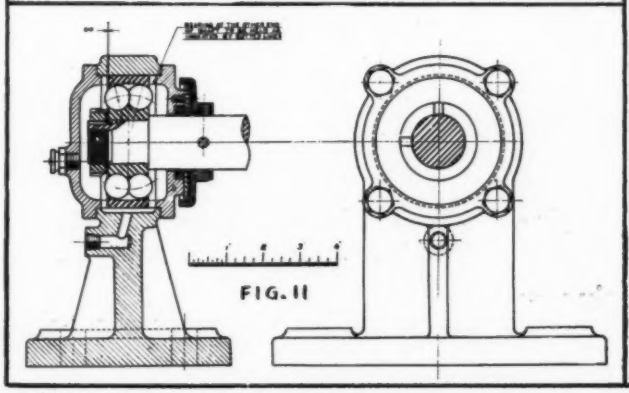


FIG. 11

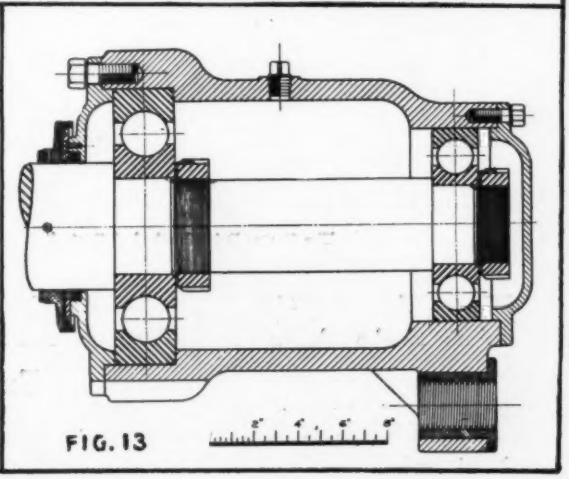
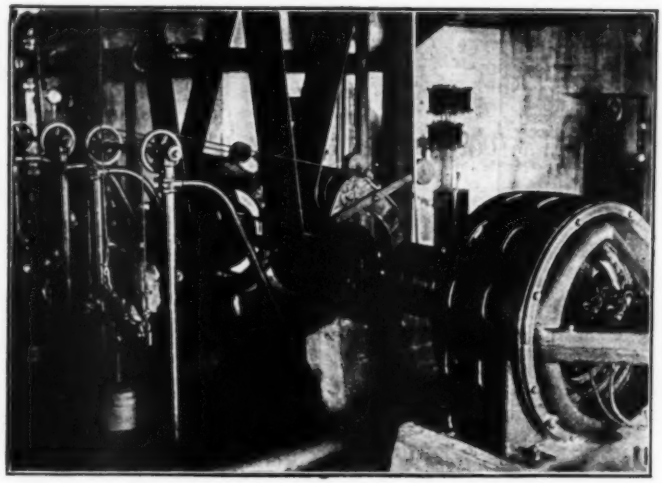


FIG. 13

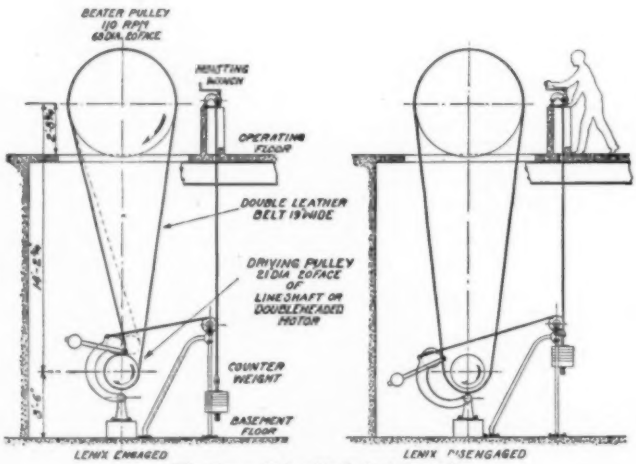
THE LENIX* DRIVE

Lenix Drives are now used in more than sixty paper mills in the United States and Canada. One mill has twenty-five; two have fourteen each and in the remaining mills the number of Lenix Drives ranges from ten to one.

The number of users is growing steadily.



The installation illustrated of two beaters driven through Lenixes from one motor is a layout that is meeting with increased favor in the paper industry. The independent operation of the beaters is assured. Uneven stretch of belts is taken up by the Lenix and used to increase the arc of contact on the motor pulley. Sudden and wide variations in the load caused by foreign matter in the beater are compensated for by the Lenix.



The Beater Drive Method of Control

Controlled by a hoisting winch on the beater floor, the Lenix is used as a starting and stopping device.

Booklet "Saving Slippage & Space" contains interesting data in belt drives—Send for a copy.

This company will have an exhibit at the Second Paper Industries Exposition to be held at New York, April 7-12. Those who attend are cordially invited to call at our booth or at our office at 50 Church Street.

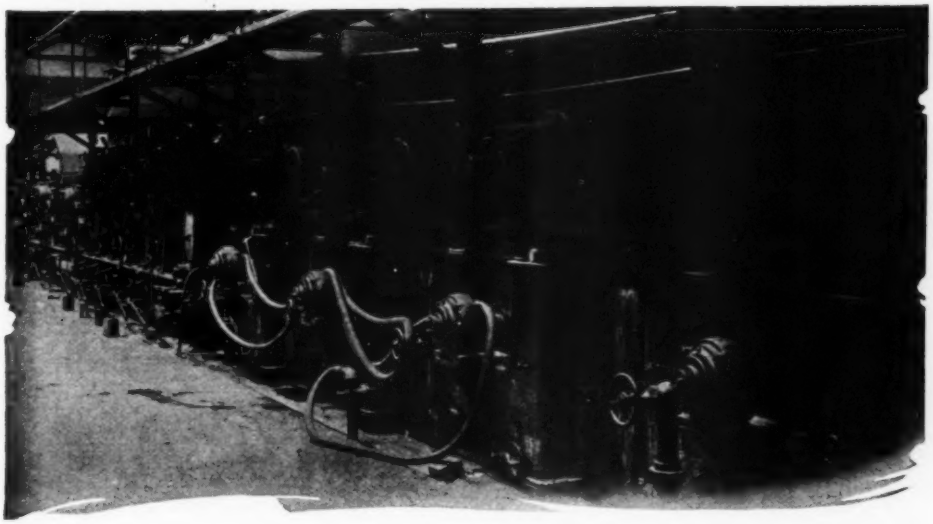
F. L. SMIDTH & COMPANY

Engineers

50 Church Street, New York, N. Y.

*Registered.

SKF



Ball Bearings on Cylinder Moulds
Increase Life of Felts

THE drag of felts on cylinder machines, due to the friction of plain bearings, is one of the chief factors in shortening their life.

On this 140 inch, 200 foot per minute board machine friction is practically eliminated as the six cylinder moulds are mounted on Skayef self-aligning ball bearings, insuring minimum drag on felts and wire face of cylinder moulds.

The easy running qualities of Skayef self-aligning ball bearings add from 15 to 50 per cent. to the life of felts on cylinder machines so equipped, decrease the annual cost of felts and effect savings in time and labor required to change them. Lubrication of the ball bearings is only required at infrequent intervals as sealed housings retain the oil and keep water out, effecting maintenance savings.

Let our engineers point out the advantages of ball bearings on your paper making machinery.

THE SKAYEF BALL BEARING COMPANY
Supervised by SKF INDUSTRIES, INC., 165 Broadway, New York City

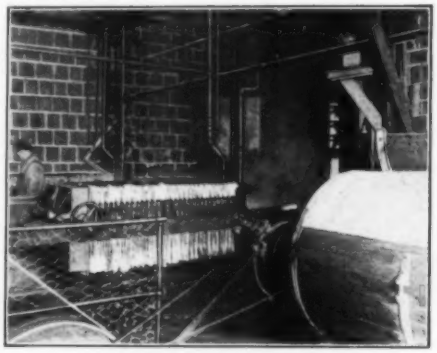
2149

Normal View

Deflected View

BALL BEARINGS
The Highest Expression of the Bearing Principle

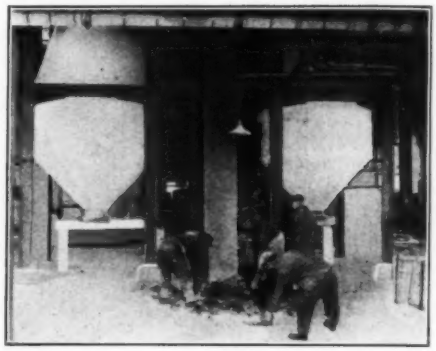
What Superior Service Stands for in Rosin Sizing



QUALITY

Cleanliness
Uniformity
Adaptability

Plants in all papermaking centers



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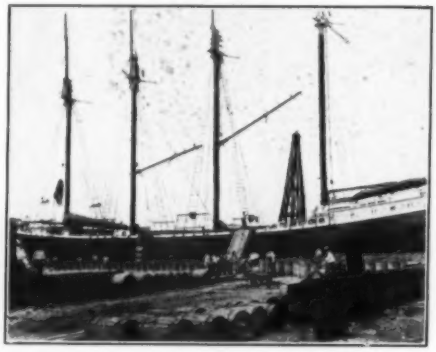


QUANTITY

Two and quarter million pounds Superior Rosin Size daily

Three Rosin refineries

Fleet of tank cars

Fleet of schooners

QUANTITY

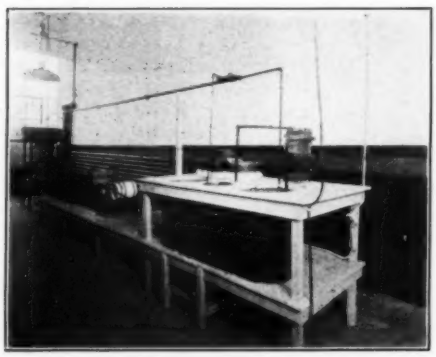
TECHNICAL SERVICE

Complete Chemical control from "Tree to Beater"

Consultation on details of Emulsifying and installation of equipment

Assistance at all times in application to suit your special needs

Completely equipped laboratories, both research and practical, at your disposal



TECHNICAL SERVICE

SUPERIOR CHEMICALS

TRADE MARK

We also produce Satin White, Fibrous Pearl Filler, Antifroth Oil, Vegetable Tallow, Foam Killer, Felt Soaps, Coating and Filler Clays—Other SUPERIOR chemicals

Paper Makers' Chemical Co.
Easton, Pa. Holyoke, Mass.

Western Paper Makers' Chemical Co.
Kalamazoo, Mich.
Pensacola, Fla. Savannah, Ga. Jacksonville, Fla.

per minute and the breast roll, size 24 x 100", weight 5000 pounds, was mounted on ball bearings, one on each end of the roll, size No. 318 medium series having a capacity of 9700 pounds at 150 R.P.M. After six months' service these bearings were removed and examination showed an over-load condition and presence of some water. The next set of bearings, same size, operated approximately the same length of time and examination showed again an over-load condition with presence of water.

In our early consideration of the application of bearings to breast rolls, it was necessary for us to accept statements

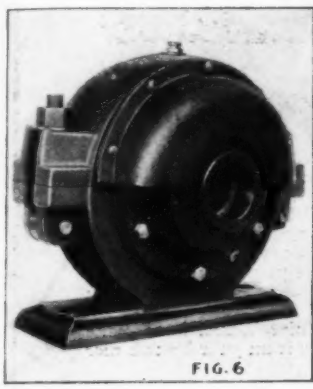


FIG. 6

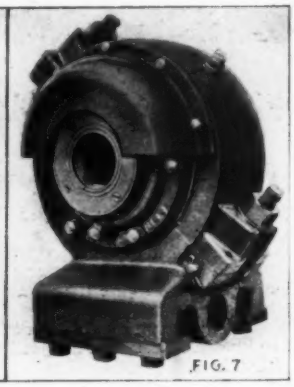


FIG. 7

from machinery manufacturers and mill operators as to the loads imposed upon breast roll bearings, and it was assumed that this load was the resultant load of roll weight and pull of the wire, which total pull of wire was between 40 and 50 pounds per inch of width, a figure arrived at by taking a weighted stretch roll 2000 pounds suspended on wire 160" wide, the wire assuming an angle of 15° with the horizontal, this producing a theoretical tension in the wire of 24 pounds per inch of width, effecting a total load on the breast roll of 48 pounds per inch of width.

The removal of the bearings above mentioned, together with those in some other installations, caused us to investigate the actual loads imposed upon breast roll bearings and although the weighted stretch roll makes possible a fairly definite calculation of loads imposed, the present day stretch roll agitated by hand wheel and screw makes possible a tension in the wire approaching the elastic limit or even the breaking strength.

In the absence of any definite information concerning the running tension in Fourdrinier wire, the S K F Research Laboratory made tensile tests of several specimens obtained from wire manufacturers.

Figure No. 1 shows the test curves for two wire specimens. These curves, prepared with the actual elongation obtained, indicate that tensions up to 70 pounds per inch (approximately the elastic limit) may occur in operation. This tension will occur between the couch roll and the suction boxes and is equivalent to the initial tension set up in the wire through the stretch roll, plus the additional tension due to friction of non-driven rolls and frictional drag over suction boxes. When anti-friction bearings are applied to breast table and wire rolls their low coefficient of friction permits of easy turning, and consequently the necessary tension in the wire to keep these rolls turning is reduced to a minimum, whereas the tension in the wire, due to the drag over the suction boxes, remains the same. By assuming a coefficient of friction of wire on hard wood of .25 and a vacuum within the suction box of 15" the tension in the wire, due to the drag over the boxes, would be approximately 1 pound per inch of width of wire per box. This means that the actual tension in the wire at the breast roll might be as much as 60 pounds per inch per side, or a total pull on the breast roll of 120 pounds per inch of width of wire. This, we believe to be high and in making our calculations for breast roll bearings we use a figure of 40 pounds per inch of width per side, or a total of 80 pounds and check against these results the load that would be imposed upon the bearing when the wire tension would reach 60 pounds per side, or a total of 120 pounds.

Based upon this study of the problem we have now, on the 24 x 160" breast roll mentioned in previous paragraphs, one self-aligning bearing on each end of the roll, this bearing having a capacity of 36,900 pounds at 150 R. P. M. Slight modifications have also been made to the housing of this bearing in order to more thoroughly protect it against water intrusion. With this modification of the mounting and the ordinary amount of care on the part of the machine mechanics, successful operation should be obtained.

Figure No. 2 will illustrate the types of breast roll boxes recommended and used.

Table Roll

The question of ball bearing applications to table rolls is again one of selection of bearing for size and type of housing design, depending upon the type of table and whether or not fitted with shaking mechanism.

The loads imposed upon table roll bearings in a non-shaking table consist of the weight of the roll plus the weight of wire and stock, and in a few rolls next to the breast roll when the slice is placed a certain distance past the center line of the breast roll, the weight of the column of water must also be taken into consideration. On shaking type tables these conditions plus the load imposed by thrust of the roll due to the amplitude and number of shakes, must be taken into consideration.

Figures No. 3 and 4 illustrate certain types of table roll applications which have been operated with satisfactory results.

Wire and Felt Roll

All the wire and felt carrying rolls throughout a paper machine are divided into two classes as far as the bearing is concerned.

First—There are those wire or felt carrying rolls of either press or drier section which must be removable for the purpose of replacing wire or felts. The mounts shown in figures 5 and 6 have been designed for this type of roll.

This design is also used to provide for angular movement of the housing brought about in certain of the wire rolls on shaking tables. Also such wire rolls as the guide roll and stretch roll or the take-up rolls for felts or wires, such as shown in figure 7.

The distinct feature of this mounting is the separable and removable housing and simple bronze casting, within which is mounted the bearing and to the sides of which are attached the end covers. When the roll is lifted out of place, the bearing, bronze housing and enclosures come with it. The bearing is therefore not exposed to dirt and water. The outside of the bronze housing is ground spherically and fits closely within a simple cast iron pedestal and forms an effective plain bearing for aligning action which comes into operation under the following circumstances:

1—Under the small but constantly repeated angular movement of the shaking type wire-roll.

2—When one end of the guide roll moves of the other end.

3—When one end of the stretch roll or take-up roll advances more than the other end.

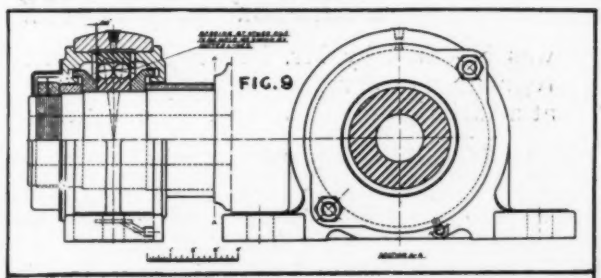


FIG. 9

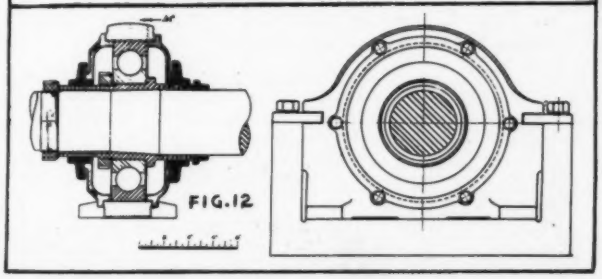
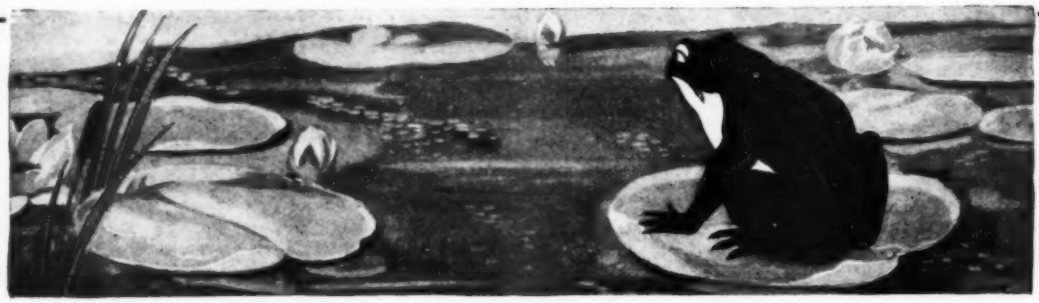


FIG. 12

4—When in removing any wire or felt one end of the roll is lifted without taking the other end out of place.

5—When the machine frame or the roll produce misalignments or deflections through distortion or settling.

Second—The second class includes those rolls which remain in a fixed position and do not have to be moved when replacing the wire or felt. Most of the felt carrying rolls of the drier section are of this type. Figures No. 10 and 11.



How far can he jump?

You cannot tell by looking at a frog, how far he can jump.

Neither can you tell by looking at the price of a Fourdrinier Wire, how much paper it will make.

Only by observation while in action—by recording the tonnage of finished paper—by testing the paper for quality—by figuring the labor, can you determine the value of a Fourdrinier Wire.

The output of your Fourdrinier Machines, the amount of labor and overhead expended, the profit your company makes, all depend upon the Fourdrinier Wire. This fact is held uppermost in the manufacture of Tyler Fourdrinier Wires.

Behind Tyler Fourdrinier Wires stands the experience of more than half a century of wire weaving. The looms on which they are woven are designed and built in our own shops for the purpose of producing wires that will give the maximum of profitable return on the Fourdrinier Machine.

To purchase Tyler Fourdrinier Wires, is to make an investment in greater profits from your Fourdrinier Machines.

THE W. S. TYLER COMPANY, *Cleveland, Ohio*

Mfrs. Fourdrinier Wires, Cylinder Wires, Backing Wires, Corduroy Wire Cloth and Hummer Electric Screens.

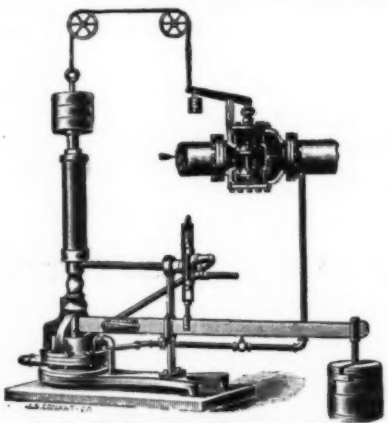
TYLER FOURDRINIER WIRES

The LOCKE Hydraulic Automatic Damper Regulator

was invented by Mr. N. C. Locke at a time when the regulation of dampers was chiefly by hand and, at best, at a variation of 10 to 15 lbs. steam pressure.

The LOCKE Regulator makes it possible to automatically regulate from one to twenty dampers, from the smallest to the heaviest, at a variation of steam pressure of one pound or less. A LOCKE Regulator is as essential as coal or oil in the up-to-date power plant. It will work equally as good where coal or oil is used to make steam.

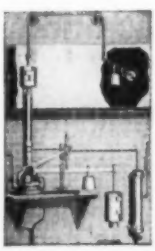
There are $3,000,000 of "LOCKE'S" in active use today, whose purchase was based on the fact that official Government tests prove that a "LOCKE" means 10% to 14% saving in coal consumption.



Locke Combination Pressure Regulator

Our Combination Pressure Regulator shown on the left is especially adapted for high pressure work and is the closest working pressure regulator we manufacture.

Eminent engineers consider our Combination Pressure Regulator to be the best regulator for close regulation there is on the market. It is particularly adapted for use on paper and pulp mills. The majority of paper and pulp mills in United States and Canada are equipped with our Combination Pressure Regulator for use on digesters.



WE ALSO MAKE THE FOLLOWING STEAM SPECIALTIES:

Atmospheric Relief Valves	Exhaust Relief Valves	"Beats All" Pump Governors	Steam Separators
Back Pressure Valves	Globe Valves	Boiler Feed Pump Governors	Slasher Regulators
Balance Valves	Non-Return Stop Check Valves	Double and Single Lever Reducing Valves	Open Float Traps
Check Valves	Paper Drying Regulators	"New Era" Reducing Valves	Water Seal Traps
Combination Pressure Regulators	Elevator Pump Governors	"Old Reliable" Reducing Valves	Vacuum Breaker Valves
Damper Regulators	Boardman Fire Pump Governors	Low Pressure Safety Valves	Water Regulators
	"Beats All" Reducing Valve		Vacuum Pump Regulators

Also manufacturers of the Locke Engine Stop and Speed Limit System to prevent flywheel explosions

LOCKE REGULATOR CO. Established in 1871 Trade LOCKE Mark **Salem, Mass.**

New York Representatives—Rowland & Bu ns, 39 Cortlandt Street. No other agency or representative in New York City.

Press Roll

Our experience in the application of ball bearings to main press rolls has been limited.

A number of ball bearing applications have been made to top and bottom primary press rolls with satisfactory results, and it is our feeling that similar applications will be found successful and advantageous for main presses. This application can be modified to include a ball bearing in the upper roll and a trunnion mounting for the bottom roll, similar to the drier cylinder application which we will describe in the following paragraphs.

The equipping of these rolls with anti-friction bearings would effect material savings in the life of felts, also in power and lubrication costs.

In the primary press section, where ordinarily the last two lower rolls are driven, all others being turned by contact with the felt and stock, the drag is extremely severe when plain bearings are used and is substantially reduced when anti-friction bearings are applied, and consequently increase in life of felt and improvement in quality of stock can be expected.

Drier Cylinders

Applications of self-aligning ball bearings to felt driers made several years ago in the U. S. are still giving satisfactory service. In these cases a single radial bearing is used at each end of the drier, and is mounted in manner shown in Fig. 9.

Seventeen main driers 60 x 173" operating on the machine designed for 700' per minute, were completely equipped with ball bearings, and started in continuous operation January, 1923, and are performing satisfactorily. This application is what is termed a "trunnion mount" and corresponds in principle to the applications made by our company some fifteen years ago on machines in other industries, and was recommended for a paper drier cylinder some twelve years ago.

Figure 8 shows the general arrangement of this trunnion mounting.

Jordan Engines

The efficiency of a Jordan engine depends upon the smallness and uniformity of the clearance between knives of the plug and the shell, and it has been found in past experience that it is difficult to maintain this clearance when plain bearings are used, due to the wear of the bearings which permits the plug to drop and consequently wear the knives of the shell uniformly. The application of anti-friction bearings to Jordan engines in the United States is becoming more and more popular, because of the absence of measurable wear in this type of bearing throughout its life, which results in the maintenance of accurate and permanent performance of the Jordan engine.

1—Production increase of 5 to 10 percent. Stock is worked all around the circumference of the plug and will consequently be refined more completely and pass through the Jordan more quickly.

2—Quality of stock improves. It is less stringy since there is no large clearance at the top of the plug where some stock may pass without being refined.

3—Life of the knives increases 15 to 30 percent, this being due to the maintained position of the plug within the shell.

4—The saving in power consumption is questionable, because the plug in a ball bearing equipped machine maintains its close contact with the shell, and consequently utilizes its entire area for refining during the entire life of the knives.

5—Reliability of the Jordan engine is materially increased particularly through the elimination of bearing wear, and also because of the fact that ball bearings require a very small amount of lubricant as compared with plain bearings. The marine type thrust bearing used in the past needed frequent inspection and this is very materially reduced through the use of ball bearing radial and thrust arrangements.

For the thrust end two bearings per housing are used as shown in figure 13. For the pulley or motor end the design as shown on figure 12 is recommended.

Complete Fourdrinier Machine

During the year 1922 an American manufacturer built for a mill in Chester, Pennsylvania, a 166" tissue machine with 70 foot wire making 13 pound tissue, designed to run at 700 feet per minute.

All rolls on this machine are equipped with ball bearings and consist of the following:

Breast roll, table rolls, suction couch roll, wire rolls, wire guide roll, wire stretch roll, wire half stretch roll, flange and deckle pulleys, press rolls, upper wringer roll, lower

TURN TO THE RIGHT!

As you enter the Exposition Hall for the Paper Industries Exposition during the week of April 7,---turn to the right!

Whether you make rolls of paper or use rolls of paper or board,---turn to the right!

If you are interested in seeing the latest developments in slitting and roll-winding machinery,---TURN TO THE RIGHT!

In Booth 6 you will find our exhibit ---bigger, better than that of last year ---including three CAMACHINES, an assortment of rolls made on CAMACHINES, and men associated with Cameron Machine Company, who are always willing to discuss slitting and roll-winding problems.

We hope to make Booth 6 interesting and pleasant to visit.

CAMERON MACHINE CO.

61 POPLAR ST., BROOKLYN, N. Y.

To Paper Manufacturers who wash pulp in hope instead of certainty

There are Oliverless mills in this country! There are paper manufacturers who still go along from day to day paying good money for pulp washing inefficiency—heaping one loss on top of another—pyramiding waste.

We ask the attention of these men to a consideration of Oliver facts. We want them to understand that Oliver filtering is an economical process that reduces overhead and helps to show a day-in and day-out profit.

Oliver Filters wash each cook uniformly.

Oliver Filters allow full inspection of all operations at all times. Simple adjustments take care of poor cooks.

Oliver Filters reduce soda losses, using less wash water.

Oliver Filters discharge a thin, uniform sheet, thus no channeling or cutting through is possible.

Oliver Filters insure maximum gravity of liquors to evaporators.

Oliver Filters deliver liquors to the evaporators free from fibre, thus there is no cleaning of evaporator tubes necessary.

Oliver Filters reduce labor costs 60%.

Specify **OLIVER**

Oliver Continuous Filter Co.

San Francisco
801 Cunard Bldg.

New York
33 W. 42nd St.

London
11-13 Southampton Row

wringer roll, upper press roll, lower press roll, 20" pressure roll, 36" pressure roll, outside drier felt rolls, inside drier felt rolls, 17 main driers, 16" winder drums, 42" winder drum, pulp roll, spreader roll, spring roll and all back drive equipment.

After this machine has been in operation for several months, the engineer of this mill wrote us as follows:

1—Starting the machine for the first time was a pleasure because every roll on the machine had been turned over by hand many times before power was applied.

2—Each bearing housing was filled with oil and a record made of the amount.

3—The machine started up freely and no overheating of the motor occurred. The complete machine is now started at times with one push-button.

4—Five months passed before the oil was removed from the housings. Check up on quantity removed showed very little loss and the oil was practically as good as fresh oil. The only reason for replacing was fear of grit or other foreign matter.

During the five months several of the press and wire bearings were drained to see if any water had worked into the housings. None was found and the oil was replaced.

5—The bearings are now checked over by the oiler once or twice a month.

6—The whole machine, including two presses, seventeen 5' driers, all drives and motor losses totals 54 H. P. at the switchboard when running at 400' per minute.

7—Machine has run about 10 months. We believe that five years from now we will begin to appreciate the value of the bearings and that our maintenance will be a minimum whereas on a machine with plain bearings, maintenance will be high.

8—All of the bearings have done the work they were selected for without any failure or loss of time, and we wish to thank you for your co-operation at the time housing designs were made and bearings sizes recommended.

We might state at this point that the total amount of oil contained in all of the ball bearing housings was thirty gallons. At the end of five months' continuous run the oil was analyzed and it was found that it was chemically unimpaired and its viscosity practically the same as when new. The oil was filtered and used for lubrication on a plain bearing machine. This is a very remarkable record when compared to the oil consumption on a plain bearing machine. At another mill in Pennsylvania, using plain bearings throughout, we learned that 26 barrels of oil were consumed in the same five months referred to above.

Lubrication

The problem of lubrication of ball bearings differs fundamentally from that of plain bearings. In the latter the actual journal load is supported upon an oil film and the maintenance of an adequate film is primarily the problem confronted in plain bearings. In the ball bearing the load is supported in the metal to metal contact of balls and races and the function of the lubricant in anti-friction bearings may be summarized as follows:

First—To reduce the small amount of sliding friction between balls and retainer.

Second—To provide a protection for the highly polished surfaces of balls and races against corrosion and rust.

Third—To assist in forming a seal against the intrusion of dirt and foreign matter into the bearing housing.

The adaptability of a given lubricant depends upon the degree to which it provides for the above considerations, without developing secondary effects of a harmful nature such as churning, leakage or acidity. The governing physical character of an oil for this purpose is its viscosity; or a grease, its consistency. Considerable experimental work done in the Research Laboratory, supplemented by actual field experience, has made it possible for us to determine the right types of lubricants to meet speed and temperature conditions and the accompanying charts show the results of these efforts.

The usual method of providing for the lubrication of an anti-friction bearing is to supply certain amount of lubricant in the housing and renew this periodically. When oil is used the housing should generally be filled to a level sufficient to submerge half the surface of the lowest ball. When grease is used a quantity to fill ¼ to ½ of the housing is usually adequate.

Under all practical conditions of operation the lubricant of an anti-friction bearing is subject to various deteriorating influences which include the effects of moisture, dust, dirt, temperature and mechanical churning action due to the rotation of the bearing. The necessity of periodically renewing the lubricant depends upon these conditions, together with the actual volume of lubricant initially applied. Where the operating conditions are unfavorable the bearings should be looked at more frequently than where the conditions are more favorable, but in general the lubricant can be applied and the housing sealed for a period ranging from one to four months. Because of the varying conditions in paper making machinery, we recommend that at first a periodic inspection of the condition of the bearings and lubricant be made each month, with a view to laying down definite lubrication schedules for the various parts of the machines.

Certain lubricant manufacturers in the United States are rendering valuable service in this question of lubrication by studying conditions under which the bearings operate and in laying down certain specific lubrication schedules which, if followed by the machine operators, will materially affect the performance and life of anti-friction bearings.

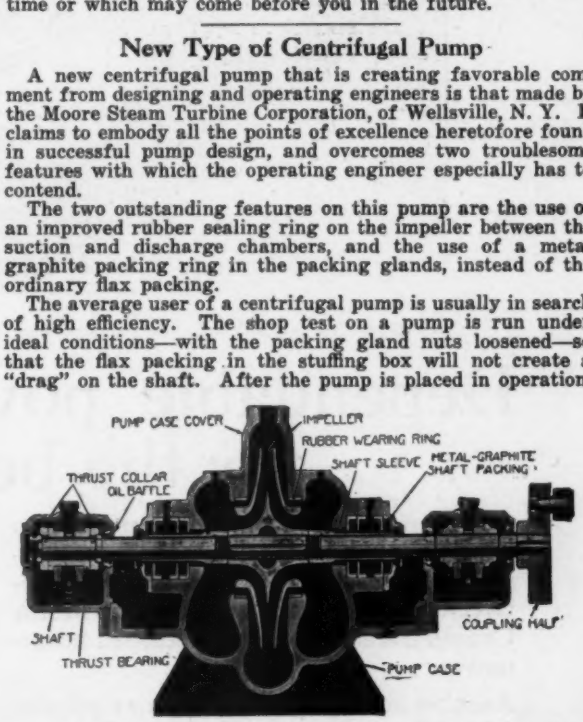
We appreciate this opportunity of presenting to you certain information concerning the application and use of anti-friction bearings on paper making machinery, and desire to emphasize the fact that it is only through close co-operation of the machinery manufacturer, machinery user, and anti-friction bearing manufacturer that the best results can be obtained and we desire to offer our fullest co-operation in solving any problem you may have before you at the present time or which may come before you in the future.

New Type of Centrifugal Pump

A new centrifugal pump that is creating favorable comment from designing and operating engineers is that made by the Moore Steam Turbine Corporation, of Wellsville, N. Y. It claims to embody all the points of excellence heretofore found in successful pump design, and overcomes two troublesome features with which the operating engineer especially has to contend.

The two outstanding features on this pump are the use of an improved rubber sealing ring on the impeller between the suction and discharge chambers, and the use of a metal graphite packing ring in the packing glands, instead of the ordinary flax packing.

The average user of a centrifugal pump is usually in search of high efficiency. The shop test on a pump is run under ideal conditions—with the packing gland nuts loosened—so that the flax packing in the stuffing box will not create a "drag" on the shaft. After the pump is placed in operation,



any workman in the plant may pack the stuffing box as tight as possible and squeeze the packing together until there is no leakage. This exerts a powerful pressure between the flax packing and the shaft and consequently lowers the efficiency of the pump. Sufficient tightening of the packing will often "stall" the prime mover.

The Moore metal graphite packing rings rest lightly upon the revolving shaft. There is no binding effect to retard rotation. The new metal graphite packing ring is in no way effected by hot or cold water and once it is properly fitted, leakage is reduced to a minimum. The life of this packing is practically unlimited when the shaft runs without eccentricity. It means that the shop test efficiency of the pump will always be maintained in service. The efficiency cannot vary, or be dependent upon the whims of a plant workman.

These pumps are horizontally split, perfectly balanced, use brass protected chrome nickel steel shafts, and are built to limit gauges in a shop equipped for and accustomed to precision work. They are built single and multistage for motor, turbine, or belt drive.

It is reported that the Corrugated Paper Company of Fort Wayne and Hartford City, Ind., will combine their two plants into one, which will be located at Hartford City. They plan to erect several one-story buildings there, using an overhead trolley system between the buildings.

MORSE SILENT CHAIN DRIVES

80 H. P. Morse Chain Silent Drive connecting motors to beaters. 590 to 143 R. P. M. 79" centers

Dependable power transmission for the beater room

Constant speed, essential to maximum tonnage of "furnish," is assured by installing Morse Silent Chain Drives between motor and beater roll shaft. Morse Chains transmit 98.6% developed horsepower.

Another advantage: The motor equipped with Morse Chains can be brought up close to the beater roll shaft; thus saving valuable space. Morse chains operate with equal efficiency over short or long centers.

To preclude damage to beater, drive, bearings, or motor, in case of entrance of foreign material between roll and bed plate, Morse Shearing Pin Sprockets are furnished. At a predetermined load the pins shear and can be replaced quickly and cheaply.

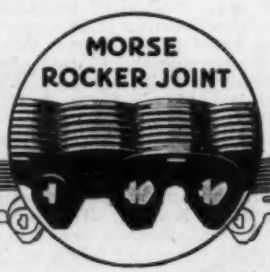
Paper mills everywhere are realizing Morse Chain Drives can be absolutely depended upon for maximum efficiency, economy, continuous, uninterrupted production, long life and low upkeep in the beater room and elsewhere in the mill.

Morse engineers will help plan a suitable drives for your mill.

MORSE CHAIN CO., ITHACA, N. Y.

There is a Morse Engineer near you

ATLANTA, GA.....703 Candler Bldg., Earl F. Scott & Co.
BALTIMORE, MD.....1402 Lexington Bldg.
BOSTON, MASS.....141 Milk Street
CHARLOTTE, N. C.....404 Commercial Bank Bldg.
CHICAGO, ILL.....Room 908, 112 W. Adams Street
CLEVELAND, OHIO.....421 Engineers Bldg.
DENVER, COLO.....1761 Wazee Street, R. M. Parsons
DETROIT, MICH.....7601 Central Avenue
KANSAS CITY, MO.....Finance Bldg., Morse Eng. Co.
NEW YORK CITY.....Room 1871, 50 Church Street
MINNEAPOLIS, MINN.413 3d St., S., Strong-Scott Mfg. Co.
MONTREAL, QUE., CAN., St. Nicholas Bldg., Jones & Glassco, Reg'd
PHILADELPHIA, PA.....612 Franklin Trust Bldg.
PITTSBURGH, PA.....Westinghouse Bldg.
SAN FRANCISCO, CAL.....Monadnock Bldg.
ST. LOUIS, MO.....Chemical Bldg., Morse Eng. Co.
TORONTO, ONT., CAN., Bank of Hamilton Bldg., Jones & Glassco, Reg'd
WINNIPEG, MAN., CAN.Dufferin St., Strong-Scott Mfg. Co.



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Big Saving Through New Boiler Plant

COAL consumption per ton of board has been reduced from 2,200 pounds to 1,200 pounds at the Mac Sim Bar Paper Company of Otsego, Mich. This figures to about $2.00 for every ton of board produced, which makes a yearly saving of from $75,000 to $100,000. Production has been increased from 150 tons to 170 tons and the power house payroll has been cut in two. All this has been effected in the boiler room alone, by the use of modern mechanical equipment.

The plans and specifications for this new boiler plant were prepared by Billingham & Cobb, of Kalamazoo, Mich., in cooperation with Charles E. Nelson, president of the Mac Sim Bar Paper Company.

Heavy labor requirements together with poor economy obtainable from the old plant as a whole, made it desirable to erect a new boiler house laid out for the automatic handling of coal and ash. The new boiler house was built adjacent to the old one and as soon as it was completed, the old one was torn down and on its site was excavated a coal-storage pit served by two tracks.

This new boiler house is 136 by 66 feet and has a basement height of 12 feet. It is built of tapestry brick and steel construction with Bedford stone trimmings. The elevation from the boiler-room floor to the bottom roof girder is 47 feet. Thorough ventilation over the boilers is insured through the installation of a large monitor with six 48-inch suction ventilators on the roof, running full length of the building.

The coal is dumped from the railway siding along the boiler room, into a track hopper and by means of an inclined conveyor delivered through a crusher to a continuous bucket conveyor making a circuit over the overhead bunker, which has a capacity of 500 tons.

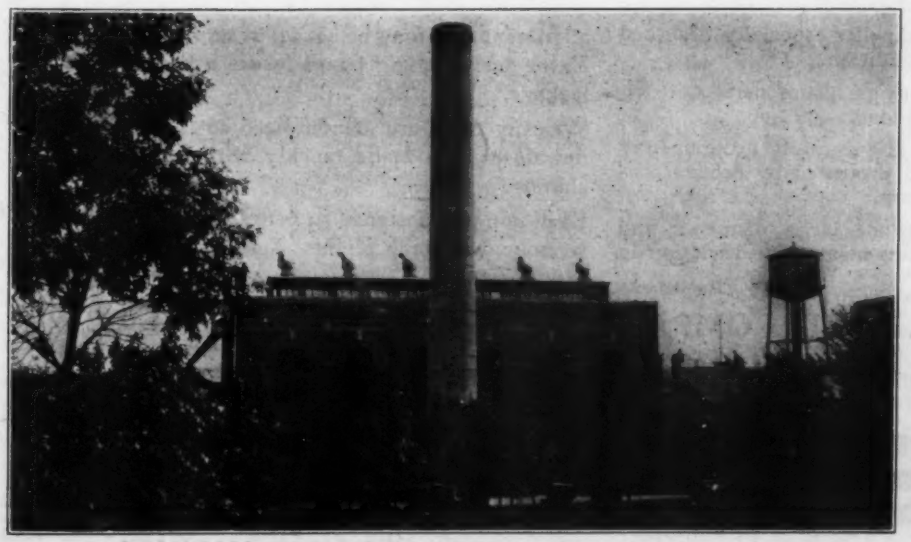
Underfeed stokers of the central retort type set in dutch ovens, serve the boilers. Steam is generated at 175 lbs. and superheated 125 deg. Normal operation is at about 165 percent of rating with occasional peaks up to 200 percent. Five boilers are maintained in continuous operation night and day by three operating shifts, leaving one boiler in reserve for cleaning or emergency use.

Coal and Ashes Weighed

The ashes are delivered from the hoppers under the stokers through counter-balanced gates into industrial cars running on tracks. The ashes are weighed before transfer is made to a skip hoist delivering into an elevated tank made of hollow, glazed, vitreous tile. An individual automatic coal scale weighs the coal for each stoker as it is fed to the boiler. Ashes are weighed on a platform scale as they pass into storage.

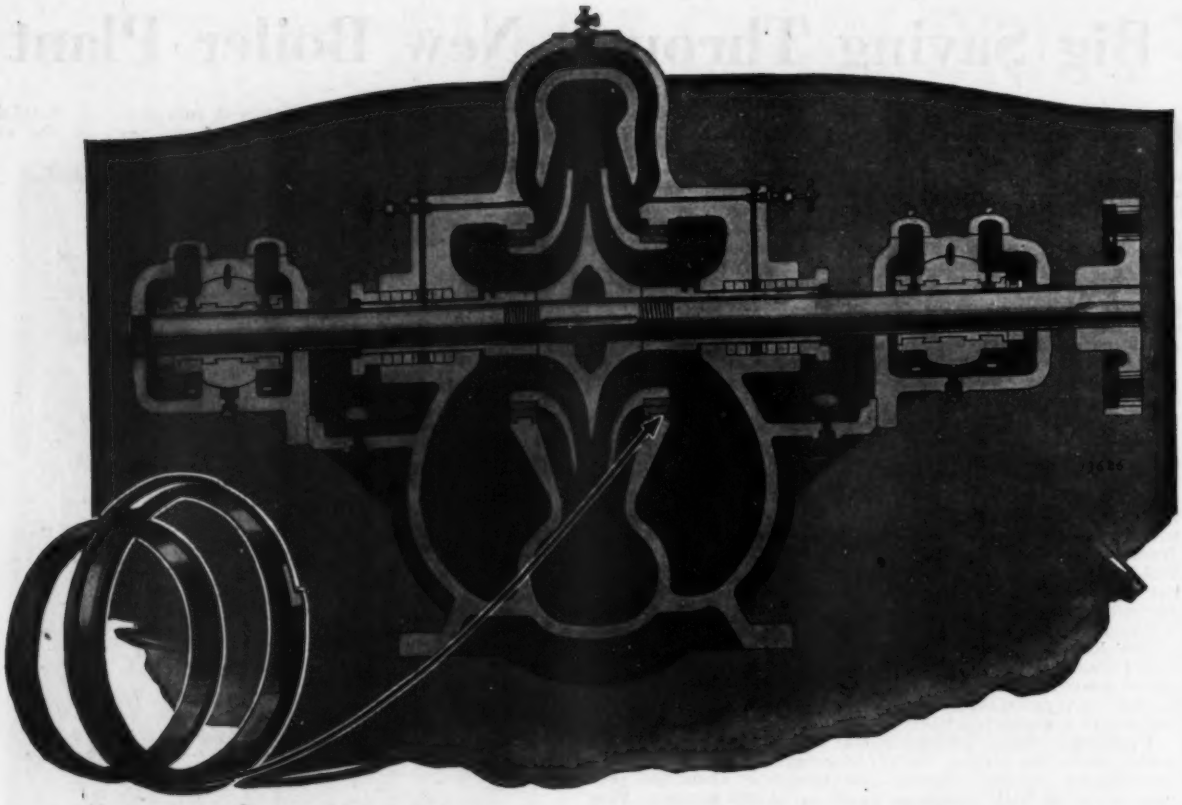
The flues are made of concrete, lined with firebrick and have been set low to serve as bases for the induced-draft fans. The chimney is of reinforced concrete, 175 ft. high above the base. Three-in-one draft gages register the air pressure under the fire, over the fire and at the boiler outlet. On each economizer multiple temperature gages show the entering and the leaving temperatures of both the gas and the water.

Interior View Mac-Sim-Bar Power Plant



Mac-Sim-Bar's New Power Plant

Six 5,000 sq. ft. vertical water-tube boilers are set singly and installed on the unit plan. All feed water returns from the mill and is brought back to the plant and passes through a grease extractor before delivery to a large open feed-water heater which receives the exhaust of the fan engines and raises the temperature of the water to approximately 200 degrees F. Make-up water under float control is admitted to the heater from a cold process water softening plant installed to serve the older station. The supply comes from the Kalamazoo River. Two wells have been sunk on the property as a re-



A Carefully Designed and Tested Pump

Backed by 60 Years' Experience

The sound judgment of Cameron Engineers is built into every pump. In relying on their experience, you get a unit of proven design, yet one that is built to meet your specific requirements.

Broad double rings are fitted around the hubs of the impeller. One is stationary and attached to the casing, and the other is attached to and revolves with the impeller. These broad rings having very small clearance, reduce the leakage from the discharge to the suction chamber to a negligible quantity.

Other reasons why Cameron Pumps have high operating efficiency and low upkeep costs are:

Double suction impeller especially designed for the service conditions.

Self-aligning bearings insure perfect distribution of bearing load.

Hard steel shaft is accurately ground, fully waterproofed and protected by bronze coverings within pump.

Flexible coupling of large diameter and well-shrouded compensates for variation in alignment that may be set up in service.

Extra deep stuffing boxes insure minimum leakage.

Wearing parts are standardized so that renewals can be made quickly without machining.

Each pump is designed to permit inspection without disturbing piping.

Bulletin 7350 on Request

INGERSOLL-RAND COMPANY, 11 Broadway, New York City

Offices in All Principal Domestic and Foreign Cities

For Canada Refer Canadian Ingersoll-Rand Company, Limited, 260 St. James St., Montreal

184-DV

Ingersoll-Rand

A. S. CAMERON STEAM PUMP WORKS

serve supply and storage maintained in two large overhead tanks. Feed-water pumping facilities consist of two single direct-acting pumps and as a reserve unit a turbine-driven centrifugal pump has been installed. Each boiler has a steam flow meter and other flow meters measure the total boiler output and steam used for production of board.

The economizers are placed at the floor level, as with boilers of the vertical two-pass type, the gas outlet is near the bottom of the setting. They are of the new counter-flow type made up of steel tubes surrounded by cast-iron fins. Water jets are employed to remove the soot. Feed water leaves the economizer at a temperature slightly exceeding 300 degrees, which is approximately 100 degrees higher than the temperature of feed water leaving the heater.

Each boiler has its independent forced-draft fan, induced-draft fan, coal scale and individual economizer. Each fan is engine-driven, belts being employed with the forced-draft fans and direct drive for the induced-draft fans.

Many Improvements Over Old Plant

The old plant contained ten water-tube boilers of three different types, which had been installed from time to time. They were equipped with top-feed stokers, a single economizer serving the plant and induced-draft fans to draw the gases through the economizer. Part of this equipment was old and worn out, so that upkeep was excessive and the labor of handling coal and ash was much greater than a uniform plant would have required due to the irregularity of the general layout, caused by the installation of vertical, horizontal and bent-tube boilers.

It is the intention of the Mac Sim Bar Company, at an early date, to erect a central generating room adjacent to the boiler house, and equip it with either turbine or engine driven units which will operate non-condensing in order that the exhaust steam may be available for drying. The shafting and mechanical drives will be removed and the mill machinery operated electrically. With this additional improvement it is expected that the coal consumption per pound of board will be reduced to ½ lb., as compared with the average mill requirement of ¾ lb. of coal per pound of board.

Following is a list of companies who furnished equipment for this new boiler plant:

Coal handling equipment, coal crusher, skip hoist for ashes by the Stephens-Adamson Mfg. Co.; ash scales by Fairbanks-Morse & Co.; stokers by Combustion Engineering Corp.; coal bunkers by Stearns Conveyor Co.; ash tank by Kalamazoo Tank & Silo Co.; coal scales by Richardson Scale Co.; boilers by Wickes Boiler Co.; superheater by Power Specialty Co.; chimney by Weber Chimney Co.; forced and induced draft fans by Clarage Fan Co.; economizers by Power Specialty Co.; feed water pumps by Union Stearn Pump Co.; feed water heater by Colles Heater Co.; grease extractor by Blackburn-Smith Corp.; water softener by Wm. B. Scaife & Sons Co.; steam traps by Armstrong Machine Works; steam separators by Crane Co.; water columns by Williams Gauge Co.; feed water regulators by Northern Equipment Co.; blowoff valves by Yarnall-Waring Co.; non-return automatic stop and check valves by Ford Regulator Corp.; safety valves and miscellaneous steam and water valves by Crane Co.; piping by Wheeler-Blaney Co.; asbestos pipe covering by Johns-Manville, Inc.; firebrick by Taylor & Sons and Portsmouth Straight Brick; steam flowmeters and draft gages by Bailey Meter Co.; steel runways by Kirlow Steel Floor Co.; roof ventilators by Ohio Body & Blower Co.; recording thermometers by Foxboro Co.; pressure gages by Schaeffer & Budenberg Mfg. Co.

Early Days of New York Papermaking

WHEN one says that northern New York is one of the leading paper producing centers of the world, he does not have to prove his statements. Daily the half-hundred or more mills in the three counties—Jefferson, St. Lawrence and Lewis—of northern New York state turn out their grist of thousands of tons of paper, much of it to feed the great presses of the city dailies or the small flat-bed press of the country weekly. A great variety of paper is made in the mills of northern New York, the output being put to every conceivable kind of use and finding a market in all corners of the world.

There are many interesting stories to be told about the paper industry in northern New York. The section was one of the pioneers in the industry in the country. Its water powers early attracted attention. The history of the industry goes back to 1804, when William Baily began the erection of a paper mill on the river Chateaugay above the town of that name in Franklin county, adjoining St. Lawrence county on the east. But this mill was never completed.

In 1807 General Walter Martin, proprietor of the township of Martinsburg, in Lewis county, erected a paper mill, which was run by George Clark & Co. The company manufactured writing paper and wall paper by hand process, but after a career of about 25 years it fell to ruin and no effort was made to rebuild it.

Mill Running Since 1808

But there is one mill in operation today which had its beginnings way back in 1808. That mill is known far and wide for the quality of its work and for the men who have been connected with it. That mill is owned by the Knowlton Bros. Company, of which George W. Knowlton, former president of the American Pulp and Paper Association, has been the president for the last 34 years. The Knowlton mill was established in Watertown in 1808. Watertown, now a city of 35,000, was then a village only three years old. That crude paper mill, which in the 116 years of its history has grown to extensive proportions, is the only one of the half-dozen mills of the first quarter of the nineteenth century in northern New York that now survives. It occupied the field virtually alone until the Civil War, when the industry began to expand rapidly.

Gordon Caswell, who had been one of the pioneer settlers of Oneida county in central New York, pushed his way through the wilderness up to Watertown in 1808. He stopped there, and on the south bank of the Black river he erected a small two-story frame building, measuring 50x35 feet. In that little building Mr. Caswell installed a small rag-beating engine, or Hollander, carrying about 150 pounds of rags; two or three potash kettles, set in a brick arch, for boiling rags and preparing the sizing; one vat for making the paper, sheet by sheet, and a rude standing press to squeeze the water out of the pack. After pressing, the sheets were taken from the pack and hung on a pole to dry and, if intended for writing paper, were afterwards dipped in sizing and again dried. No steam was used, no chlorine for bleaching, no calendering, the substitute for the latter being a process of pressing between boards. Such a mill, costing at that time probably from $3,000 to $5,000, would produce about 150 pounds of paper a day.

The mill built by Mr. Caswell was taken over early in its history by Messrs. Holbrook and Fessenden, of Brattleboro, Vt., to secure a debt. In 1824 George W. Knowlton, father of the man now connected with the company, and Clarke Rice, both of whom lived in Brattleboro, formed a partnership to purchase the Caswell mill for $7,000. At the time the partnership was formed Mr. Knowlton was conducting a store as a young man in the Vermont village, and Clarke Rice was a young printer.

Mr. Rice came to Watertown at once and Mr. Knowlton followed in 1825. The property which they purchased consisted of the paper mill, known as "The Pioneer Mill," a book store, bindery and a printing office. They continued to manufacture paper in the original mill until 1833, when they sold the original site and moved the old building a few rods up the stream. A new mill was built in 1833 on the easterly portion of the site of the original Caswell mill. This mill was equipped with two rag-beating engines and a paper machine, which was then of the most approved make. This was the first machine for making paper in Jefferson county.

This mill was operated successfully until 1848, when it was destroyed in a disastrous fire that visited Watertown. It was at once replaced with a brick mill and equipped with modern machinery. This mill was again replaced in 1869 by a larger mill and with more modern machines.

An old volume, "Paper and Paper Making," long since out of print, gives an interesting sidelight on Mr. Rice. It says of him that "Clarke Rice of Watertown, N. Y., made an improvement in the washer for paper engines, which consisted in the peculiar manner in which the vellum or wire cloth is kept free from rags or pulp in the various stages of washing, and in which the egress of water is accomplished."

Knowlton & Rice encountered difficulties in marketing their product, so they solved their problem in a unique way. Finding it impossible to dispose of any considerable amount of

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Air Heaters
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paper, they turned the product of the plant into school books. They made blank books and published miscellaneous books for public school libraries, so that in a few years the name of Knowlton & Rice was known to school children everywhere.

The break in this partnership came in 1854, when Mr. Knowlton retired from the business, which was then sold to Brown & Chamberlain. Mr. Rice retained an interest in the company, the name of which after a few years was again changed to Chamberlain, Farwell & Co.

It was to the mill of Chamberlain, Farwell & Co. that George W. Knowlton, the present head of the concern, went in 1856, as a boy of 15 years, to learn the business. In 1861, when he was 20 years of age, the company failed. The question was, what should become of the mill?

Knowlton Bros. Form Partnership

George W. Knowlton had a brother, John C. Knowlton, four years his senior, who had been employed as a clerk in Wooster Sherman's bank. John Knowlton had saved about $1,200 to advance toward the establishment of a business. With this as a nucleus these two young men—one of 20 and the other 24—decided to embark upon the paper manufacturing business themselves. Their father endorsed their note for $5,000 and they formed a partnership, which from the first was highly successful.

The new firm became known as Knowlton Bros., by which it is still known. John C. Knowlton retired from active management of the company in 1888, but the partnership continued until 1892. In that year the company was incorporated and Mr. Knowlton became its first president, a post he has held continuously since. Although relinquishing the reins to a considerable extent, Mr. Knowlton still retains an active voice in the affairs of the company and appears at his office daily. In addition to his duties with Knowlton Bros. Company he serves the Watertown National Bank as its president.

About two years ago the Knowlton mill took a considerable step forward when it purchased the old factories of the New York Air Brake Company, adjacent to its mill in Mill and Factory streets. These buildings were remodeled and now the manufacture of a paper is a continuous process from the beaters to the shipping room. Previous to the purchase of the new buildings the paper had to be carried from the machines across Mill street to the finishing room. The mill is equipped with two paper machines.

Aside from the Chateaugay and Martinsburg mills, of which mention has been made, and the Knowlton mill, there were only one or two other paper mills of any account in Jefferson county before the Civil War period. Of the mills which were started after the middle of the nineteenth century all survive to the present day.

On May 23, 1833, the paper mill which Elisha Camp had built at Sacketts Harbor, eleven miles west of Watertown, on Lake Ontario, burned with a loss of $18,000. The money loss on the mill was only a small part of the money that was sunk in this scheme, and with the loss of the mill and with the failure of the power canal scheme to materialize, the hope of the little community's ever becoming a manufacturing center went aglimmering. Several hundred thousand dollars were spent in digging a canal between Huntingtonville, a short distance below Watertown, and Sacketts Harbor, taking the water of the Black river about twelve miles across country. The canal was actually finished, and drawing power from it were the paper mill, a grist mill, two sawmills and a plaster mill. The difficulties of maintaining "Camp's Ditch," as it was called, finally led to its abandonment.

The other paper mill in the early history of northern New York was located at Woodville, a hamlet of Jefferson county, far removed from any railroad. There seems to be no record as to just when the mill was built, but it was constructed about 1846 by C. and O. Clark. The mill was originally equipped with four rag-beating engines and a small machine. The mill burned in 1855 and was rebuilt the following year with four large engines and a 62-inch machine. It turned out one ton of print paper a day. Hard luck pursued the mill after the fire of 1855. In 1864 it was again destroyed and was rebuilt on a different site by J. B. Clark, a cousin of the former owners. In the early '80s the owners found it impossible longer to operate and sold the machinery. The building fell to ruins and was removed four or five years ago.

The suit of the United States vs. the Nashville Industrial Corporation, in which the government sought to set aside the contract of sale of the Old Hickory powder plant at Old Hickory, Tenn., on allegations of fraud, was dismissed by a decree entered in the Federal Court at Nashville, February 23, 1924. Admission was made by the government that no fraud had been practiced by the Nashville Industrial Corporation.

Benefits to Be Derived from an Active Division of the Superintendents' Association*

By FRED J. ROONEY
Genl. Supt., The Upson Company

THE honor given me to talk to you superintendents of Canada is greatly appreciated, indeed, and I sincerely regret that I am not better able to give you such a message on "Benefits to be derived from an active division of the Superintendents' Association" that would inspire this Canadian division to become the greatest of all divisions.

The great industry which it is our privilege to be a part of, in fact, the superintendent is the keystone without which the paper industry would, like an arch, fall—is an industry most vital to the welfare of mankind.

Paper—what would the world do without it? The maid or your wife takes in the milk bottle—a paper cap is over it. You look for your morning paper. You note something on an envelope or pad to attend to on the way to your mill. A telephone call is made; the number is found in the directory; the message is sent through the exchange, where without paper short circuits and many other troubles would develop and prevent your call going through. You arrive at your place of business. No paper! Can you imagine what a day it would be in the modern business man's office with no paper! Or in the home life as well!

Of course we superintendents do go to business some mornings and find no paper, which means Some day and Some language.

From a very small beginning the Superintendents' Association has grown to a large and most valuable association.

Association Once Looked Upon with Disfavor

For a time many owners and managers were opposed to the association, due to a lack of realization of just what benefits the association would bring in the way of improved quality and increased production to those mills whose superintendents were members of the association.

The day of not exchanging ideas among the successful papermakers is past. The executive or superintendent who does not desire to exchange his views with others in the industry is an executive or superintendent whose plant is soon going to be a back number; in fact, it must be now.

Any man in honest and open free discussion in reference to the paper industry will always get as much as he gives, thereby increasing the efficiency of his plant and consequently benefiting the industry at large.

We superintendents are all fighting waste. Waste—the greatest thief of mankind. Waste is something of value, which, due to carelessness or maliciousness, is lost or thrown away.

Through an active division of the Superintendents' Association discussions on the subject of waste may be held; and, as a result of such discussions, every superintendent in attendance receives a thought of where he can cut some waste in his plant. Here, again, the entire industry is benefited.

Waste in any mill of any kind is an item of expense which every individual has to bear his share of, just as we do in the waste due to fire loss. Due to an exchange of ideas at a division meeting, the possibility of reducing accidents may be brought out. What executive or superintendent does not wish to eliminate accidents from the industry? Accidents, in my opinion, are properly chargeable to waste in 75 per cent to 80 per cent of the cases. Any preventable accident—and I feel that 75 per cent to 80 per cent are preventable—are chargeable to waste.

Keeping Apace with Progress

Through an active division of the Superintendents' Association, you men will be keyed up to the proper pitch. You will not become "old fogies." You will be kept from becoming enslaved by old and worn-out ideas. You will keep your mind open, ready to profit by the new experiences of others.

You will be enabled to keep your minds open—like the fine white sheet of paper some of you make—plenty of room for more writing upon it. If you shut yourselves up in your own plant, or with a few men of your own organization, you are mighty likely to become like an old blotter—so full and black with old ink that you can absorb no more.

From meetings of your division, where discussions develop out of careful thought expressed in some paper read, you superintendents will develop habits of correct and effective thinking; and, due to such habits, be men of greater value to yourself and also to mankind.

No man is so dense, so stupid, as one who, while unsuccessful, persists in holding to the thoughts which make him so

*Address before meeting of Pulp and Paper Mill Superintendents' Association, Montreal, Canada, Jan. 25th, 1924.

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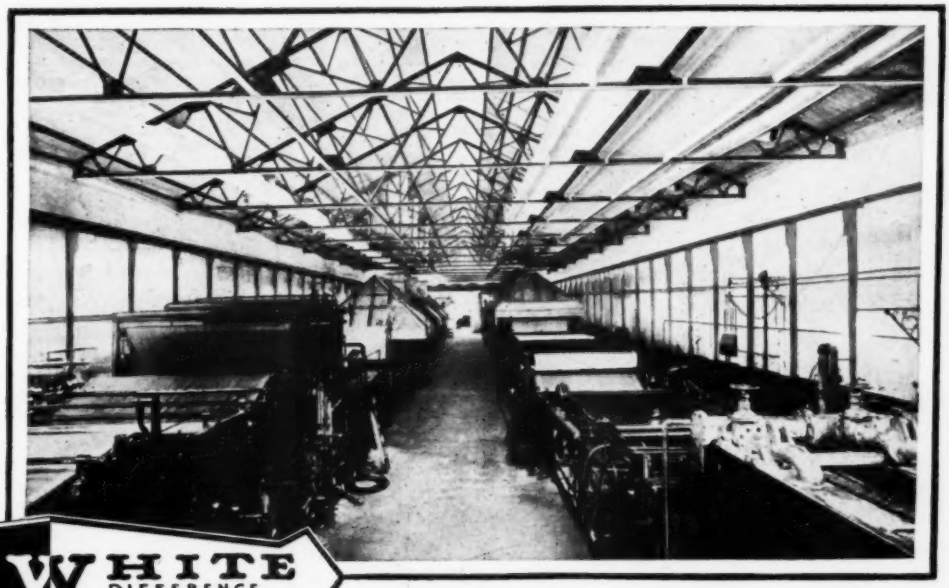

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- Degracolin-*Concrete floor hardener*
- Degraco Enamels
- Industrial Finishes

(212)

How often does the paint manufacturer know just where in your mill his products will be used? Yet, how else can he---or you---be sure that the paint supplied will stand up?

There are many abnormal conditions which paint must meet in paper mill operation. This does not mean that a variety of 'special brews' are necessary.

It means simply this---the assembly under the right formula of pigments and vehicles that are most suited for each particular purpose. It's the know-how that counts.

The paint manufacturer who best knows your conditions and the types of paint to meet them can best serve you.

Degraco Paints for the Paper Mill have maintained an enviable reputation because of their proven suitability for the conditions encountered. Let us submit paint recommendations to you.

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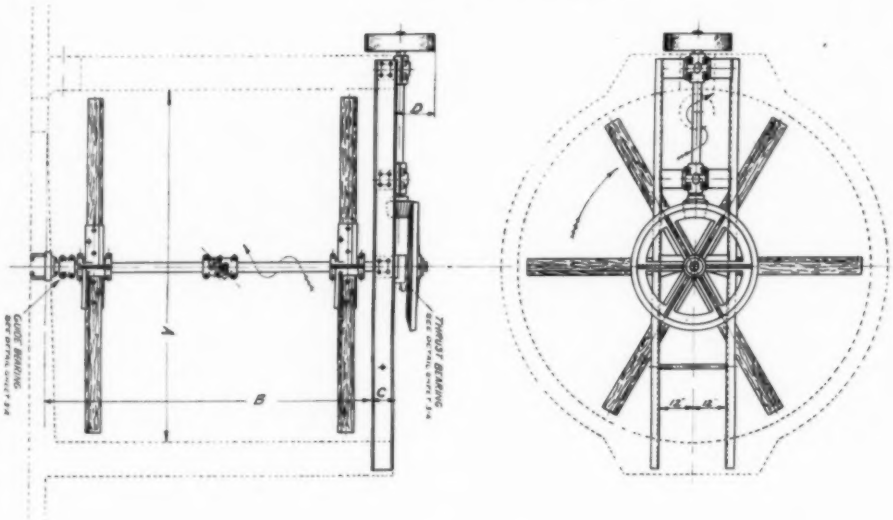
DEPTH OF CHEST	B	
COVER OF CHEST	C	
PULLEY FROM FLOOR	D	



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MIDDLETOWN, OHIO

and refuses to try other methods because he does not believe in them.

We superintendents in many cases have had experience with technical men—chemists, cost accountants, etc. Now, there are some mighty good fellows among the classes I have just mentioned. However, no paper plant can be successfully operated by either one without the assistance of a capable and practical superintendent.

To operate a paper mill by a technical man has been tried and failed. Personally, I believe a good cost man and a good chemist are of great value to any superintendent, but only when there is honest co-operation by all.

That the Superintendents' Association has accomplished a great deal to bring about honest co-operation I do not hesitate to say, and this statement cannot be successfully disproved.

The technical men have come to realize that a capable superintendent is absolutely necessary, as has also the cost man come to realize that only through such a superintendent can he hope to get information vital to his work. They must have correct information to get accurate costs.

Realization of the true value of a capable superintendent has been brought to these men almost wholly through the Superintendents' Association and its divisional meetings.

That there are successful superintendents outside the association no one in it disputes. That you may be successful, though you never are a member, is also true. If you are successful the association needs you, for through it you can do much to benefit the industry at large, and any benefit coming to the paper industry is bound to benefit you; so, you see, however successful you may be, it is possible to be even more so. So an active division of superintendents in Canada will, beyond all question, be a benefit to every papermaker and paper and pulp plant in the Dominion, regardless of the fact that all superintendents may not be members.

Did any of you fellows hear of, or have you just a speaking acquaintance with some other superintendent whom you thought was impossible—a dumb-bell, etc.—only to find out later, due to meeting and becoming socially acquainted, that he was a prince?

Well, by an active division of Superintendents' Association you fellows are going to find out what a real, honest-to-God bunch of good fellows you are, collectively and individually. Through an active division of Superintendents' Association friendships will develop and will be made less of a business than has been the case in the past.

To quote from Edgar A. Guest: "There is a sense of serenity and of comfort in knowing that next door, and across the street, and all around me, are people who care about what happens to me; people who are always showing me little kindnesses, and who, when sorrow comes—as it must come to all of us—make my grief their own and so help me bear it."

Is this not expressing just what we superintendents want to live and feel in our work and life together? There is no better way to bring such a condition about than by having an active Superintendents' Division in Canada.

Association Benefits

In conclusion let me list a few of the benefits I have tried to bring out in this talk:

First—Increased fellowship among superintendents.

Second—Greater efficiency due to exchange of ideas.

Third—Better quality produced as the result of papers read and discussions held.

Fourth—Increased tonnage as result of ideas gained from discussions.

Fifth—Reduction of waste.

Sixth—Reduction of accidents.

Eighth—Better knowledge of new equipment as result of papers read by experts.

Ninth—Greater co-operation between superintendents and cost and technical men.

Tenth—Better co-operation between executives and superintendents, due to desire of superintendents as result of enthusiasm gained at divisional meetings to give his best to his work.

Men, you need an active division of the Superintendents' Association in Canada.

Forest Protection Week Set

President Coolidge has designated April 21 to 27, inclusive, as this year's Forest Protection Week, according to information received by the Forest Service, U. S. Dept. of Agriculture.

Forest Protection Week this spring will mark the fourth annual observance of an intensive campaign to acquaint the public with the serious and unnecessary damage caused by forest fires. More than 36,000 fires are reported in the United States every year, and an area of about 11,000,000 acres are swept by the flames.

Power Transmission by Belting*

By J. E. RHOADS

THE keen competition which is so universal in all lines of business makes necessary careful study and investigation of production costs. One of the most effective ways of cost reduction is through increase in production. Economizing of power is another factor which in certain industries is of great importance.

As a manufacturer of leather belting, I have been asked to talk to you on that subject, but I want to also attempt to explain some of the principles entering into power transmission by belting, whether it be of leather, rubber, canvas or other material. There are perfectly proper and legitimate uses for nearly every kind of belt and there are a few types of drive where leather belting will not work as satisfactorily as rubber or some other fabric. They are usually either conveyor drives or transmission drives, where the belt is subject to strong acid, strong alkali or some other chemicals to which leather fibre is not resistant. It was long thought that leather belts were unsuitable for wet conditions, but since the use of thoroughly waterproof cement and proper methods of treatment leather belts run in all kinds of wet conditions with satisfaction and economy. Where oily conditions are met with leather belt of the right kind has proven to be the best thing. It may be said in a general way that the problem of the engineer is first to design his drives so that they will be reasonably economical and then to choose the type of belting best adapted for the conditions.

Power transmission by belting had not been carefully studied until within the last few years. As you look at a belt pulling hundreds of horse-power smoothly and effectively year in and year out the problem appears a simple one. A little study, however, shows that there are a lot of factors involved. The scientific work done by individual manufacturers and others has been aimed at finding out, by actual test, the effect of these various factors. Of these some are inherent in the belt itself, such as the nature of the surface, the width and thickness, the weight of density, the flexibility of the belt, its elasticity, its resistance to stretch, and its strength. Another group of factors have to do not with the belt itself but with the conditions under which it is operated. In this group are included the speed of the belt, the tension under which it is run, the arc of contact on the pulleys, the kind of pulley used and the humidity and temperature prevailing. All of these variables have their bearing on the amount of power the belt will transmit and the efficiency with which it will do it, or on its durability.

In addition to machines for measuring power transmission itself and with it tensions and slip, we have other devices for testing the adhesion or gripping power of the surface (coefficient of friction), tensile strength, stretchiness, etc.

First let us consider the nature of the surface. It is one of the most important factors, for upon it depends the friction on the pulley. An efficient leather belt has a surface with a tacky, clinging quality. It is not slippery and is not usually highly glazed. On the nature of this surface depends largely the difference in behavior between leather and fabric belts. The better grades of rubber and cotton belts will work fairly well up to a moderate load while any appreciable overload causes them to slip badly, though this sometimes is not noticed because they slip without jerking. An accurate speed counter will, however, prove the loss when they are slipping and the power loss is directly proportional to the slippage. There is something about the surface of a good leather belt that enables it to stick to its job, when an overload is applied, without undue loss of power, or, what is much more serious, loss of output.

To compare the surfaces of different belts, we measure the coefficient friction. If a belt of leather or any other material be laid on a flat table and a block of smooth castiron placed on its surface and attached to a spring balance, the pull required to slip the block on the belt can easily be measured. The coefficient of friction is the ratio of this pull to the weight of the block. If the block weighs 20 pounds and it takes a 5 pound pull to move it the coefficient of friction is five-twentieths, or .25. A better sample of belt might require a 10 pound pull and the coefficient of friction would be .50. This value does not depend on the area of contact, but as between leather and iron it does depend not only on the surface of the leather but also on the speed of slipping. This curious fact is largely accountable for the leather belt's property to carry overloads; it is not possessed in like degree by fabric belts. With leather, as the slippage increases the gripping power also increases.

The statement made above, to the effect that the amount of

*Address before the American Pulp and Paper Mill Superintendents' Association, Kalamazoo, Michigan, February 21, 1924.

U. S. Patents: Dec. 10, 1918, and June 7, 1921.
Canadian Patents: July 5, 1928, also Patents Pending.

Are You Trying to Pull a Greater Production?

THE Fulton System is an elephant for increased production—not one of the many installations of the Fulton Forced Vapor Circulating System has failed to increase production at decreased costs.

The Fulton System is a thoroughly tried, efficient and economical method of removing all the water and air from paper machine dryers; even if a small quantity of water or air is present in the dryers, you can never reach your possible maximum drying capacity, and some are unaware that this condition exists in their dryers.

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Specializing in Paper Drying

surface in contact does not affect the grip, would lead one to suppose that a narrow belt would carry as much load as a wider one. In practice this is impossible, or at least inadvisable, because the narrower or thinner belt cannot, over a long period of time, maintain the tension necessary to carry the heavier load. In theory, however, it is possible and we have proven it in our laboratory in two very interesting ways. First, with a belt having a very irregular surface, so irregular that less than half of its area touched the pulley. It carried just as much load as a belt of the same type with a smooth surface. In the other experiment we devised a means of testing a certain belt carefully, having the whole surface or width in contact with the pulleys and then removing half of that surface with a very small reduction in the cross section of the belt. By maintaining the same tension and speed the belt with only half of its width in contact with the pulleys carried exactly the same loads, at almost exactly the same slippages, as were shown by the first test, when the whole width was in contact with the pulleys.

The tendency of a belt to stretch is very undesirable when excessive and we will distinguish it from the natural elasticity. This may be very small at the tensions ordinarily used but it may have an important bearing. A belt is thrown onto the pulley, or put on with clamps, at a tension, let us say, of 35 to 40 pounds per inch of width per ply for each strand. The tension on both strands is equal; when the pulleys start to turn and the load is applied the belt must have a tight and a slack side; the difference in the tensions of these two sides is the effective pull, and that is what transmits the power. As the elongation of a given portion of belt depends on the tension it is obvious that the belt is stretched more on the tight side than the slack side. A section of belt is then longer when passing onto the driving pulley than when passing onto the driven pulley. The contraction occurs chiefly on the driving pulley just before the belt leaves that pulley, and the elongation occurs on the driven pulley just before the belt leaves it. This behavior is called "creep," and as the load increases on a given belt the amount of creep increases and the fibres on the surface of the belt creep over the pulley surface through a larger part of the arc of contact. With normal loads and an efficient belt this creep usually amounts to one to one and one-half percent; with overloads it is higher. When a point is reached at which all of the surface of the belt in contact with a pulley is traveling at a speed slower than the pulley surface, we have real slippage, as well as creep. It is natural that some belts will creep less for a given load than others and when they do they either save power or increase production, or both.

Another factor of the greatest importance is belt speed and the power transmitted by a given belt is nearly proportional to the speed up to about four thousand feet per minute. It would be proportional at all speeds were it not for the effect of centrifugal force. Centrifugal force tends to throw the particles of the belt away from the pulley, when passing over it, thus lessening the tension which holds the belt to the pulley and lessening its capacity. As this force is proportional to the square of the speed it is obvious that if the speed is doubled there will be four times the tendency for the belt to fly away from the pulley. With belts of ordinary density, this force becomes so great that at speeds above about fifty-five hundred feet per minute the power actually lessens with further increase of speed, unless the belts are retightened to what are excessive initial tensions. As the centrifugal tension varies with the weight of the belt it is desirable, other things being equal, to use belts that are light for very high speed drives.

To waste a minimum of power in friction on bearings it is clearly desirable that the required effective tension be obtained with the least possible tension in the two strands of belt. For instance, to transmit one horsepower at a belt speed of one thousand feet per minute requires an effective tension of 33 pounds. You may have one belt that is tight or inefficient with a tension on the tight strand of 45 pounds and on the slack strand of 12 pounds, giving a difference of 33 pounds. This gives a pull on the bearings of 57 pounds. Another belt of high efficiency may have a tension on the tight strand of 2 pounds and on the slack strand of 35 pounds, or a total on the bearings of 37 pounds. This would give only about 65 percent as much loss in bearing friction as the former belt. In tests we have had a ratio of more than one hundred to one in the tension of the two strands. This, of course, is abnormally high, but indicates what may be possible.

The effect of arc of contact is striking, the power delivered being about proportional to the arc of contact up to one hundred eighty degrees and beyond that point increasing at a somewhat lower ratio. It is, however, very desirable to secure as large a contact with the pulleys as possible. The newer type of gravity binder drives are most useful for accomplishing this, especially where center distances are short and pulleys very unequal in size.

Tests have indicated that where the tension is applied to a belt of given thickness, in proportion to its width, that the horsepower will be also proportional to the width, under similar conditions of speed. The natural flexibility of a belt effects the ease with which it bends around small pulleys and the thickness, of course, enters into this, too. Naturally the thinner and more flexible the belt the less will be the power lost in internal friction and the better will be the contact on the pulleys, especially if they are of small size. Rubber and canvas belts as a rule do not compare favorably with the best leather belts in this respect. Their surface usually is better when they are new, and often hardens or loses some of its pulling power with age. With leather belts, however, the pulling power often improves for some time and maintains a high efficiency through a very long term of service. Maintenance of this quality is of the greatest importance. The test of time on thousands of drives has proven to many of the largest companies and engineers that for efficiency in power transmission and economy per unit of output there is nothing like leather.

Heat Economy in Machine Room Ventilation*

By T. J. HIGGINS

Manager Ross Engineering of Canada, Limited,
New Birks Bldg., Montreal, P. Q.

FROM a heating and ventilating standpoint, economies in other departments of the mill, while important, are dwarfed by those possible in the machine room, and as the various uses of air in the paper industry are so very numerous, space requires that we limit this article to its application in the machine room only.

However, I will try to show not only the different methods of ventilating the machine room, but also what the problem is, and particularly bring out some of the knowledge which has been accumulated in the last few years on a subject which has in the past been treated mainly by "rule of thumb," and in accordance with the judgment of the individual designer.

In general I should say that the machine room presents not so much a heating problem as a ventilating problem. This is on account of the heat given up by the dryers, and which is almost enough to keep the room comfortable, even in cold weather, as to temperature, except possibly at the extreme ends of the room. There is, however, a large amount of vapor arising from the machine, and this amounts roughly to about 2 lb. of water evaporated per lb. of paper. In other words, a machine turning out 50 tons of paper per day is evaporating approximately 100 tons of water per day, and this must be taken care of unless there is to be serious trouble with fog and condensation.

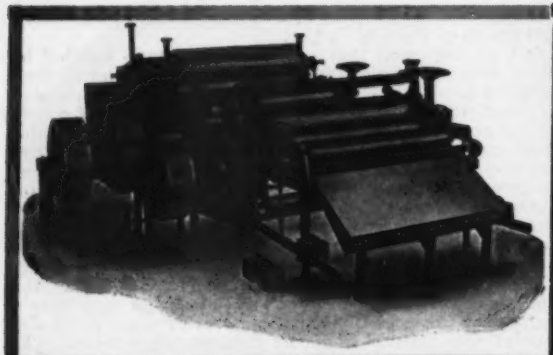
Probably the oldest system for ventilating a machine room was to permit the vapor-laden air to escape through the roof, either by natural draught or by the use of fans, and allow air to leak into the room to take its place. If this air came into the machine room from some other department of the mill, conditions were not very bad, but if it had to come in around windows and doors, the cold air would cause condensation and drip. The next step was to put steam coils under the roof to keep the temperature here above the dew-point and prevent this drip.

Then came the system of forced ventilation whereby a quantity of air, practically equal to the air being removed from the roof, was preheated and admitted to the machine room. This was a big step in advance, and until very recently seemed to answer the requirements. The air was usually blown on the roof, as it was found that most of the condensation occurred there, and that by keeping the roof warm it could be largely prevented.

However, the application and the quantity of this air varied, depending upon the opinion or judgment of the engineer and mill owner. The type of installation depended on how much money it was desired to put into the system, or upon how much power could be given up to the system, or on whether exhaust steam could be used for heating the air, and for the most part ducts were run wherever it seemed that there was the best space available.

It may be gathered from the foregoing, that little attention was paid to the method of introducing the air, or the manner of its application. Contracts for ventilating systems were awarded to the concern that would guarantee to deliver the largest amount of air and heat for the smallest amount of money. The volume of air was usually based upon changing

*Read before the Technical Section, Canadian Pulp and Paper Association, Montreal, Jan. 23-24, 1924.



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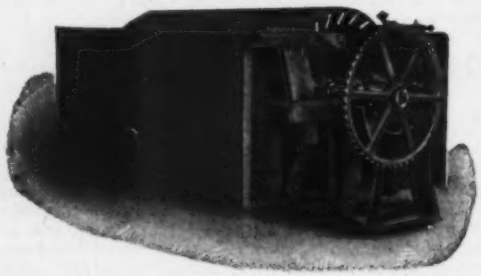

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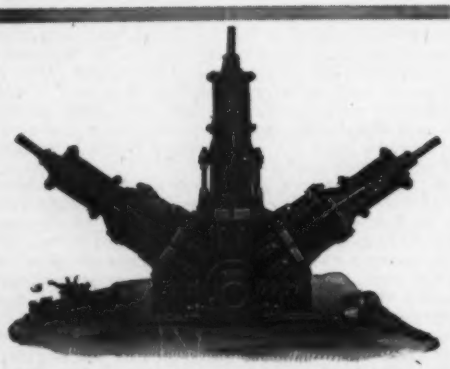

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the air in the machine room in so many minutes, and it became common to specify a five minute air change, or if that seemed too big an item for commercial reasons, a 10 minute change, or even a 15 minute change might do, in these cases it being considered necessary to heat the air to a higher temperature in order to offset the smaller quantity.

We need not point out that this method of figuring a system was all wrong. The practical experience that would cause a man to decide on a five minute air change for the reason that in some other mill it was used and worked out satisfactorily, does not take into consideration the construction of the building, the amount of glass surface, exposure, whether a warm or a cold roof, whether machine is hooded or not hooded, the amount of water evaporated, nor the fact that one machine room might have about half the cubic measurement of another mill producing the same amount of paper.

The only test was—"Does it keep the room clear of all vapor and drip?" If it does it is a fine system. If it doesn't then it isn't big enough, and the only cure is to put in more or larger apparatus. The fact that there might be an ample supply of air, if properly applied, was rarely considered, and this haphazard method of engineering has not only led to systems unsatisfactory to owners because they did not remedy the drip and cold, and were expensive in cost and operation, but has led to systems which keep the room dry and warm, and so are entirely satisfactory, but which would not be so satisfactory if the owners realized fully the waste of heat and power that goes steadily on. We are not dealing in this article with systems which are not large enough (and there are plenty of these), but we are dealing with systems which are too large, or which are large enough but do not produce the desired results.

We haven't the space in an article of this kind to describe instances in detail, but in one mill we investigated, and who were thoroughly pleased with their system, we found the air going to atmosphere 30 per cent saturated, and they were not so pleased when they discovered they were using 1,100 boiler horse power to ventilate that room, when they should have been using not over 500.

Of late years, however, it has come to be recognized that air discharged along the roof of machine rooms doesn't perform any other duty beyond carrying off the moisture. A number of years ago, the present so called vapor absorption system was developed under the Belcher-Wilson patent, and was especially applicable to machines operating without dryer felts, such as board, pulp machines, etc.

I don't think there is any question but that when a machine can be supplied with a system of nozzles on the dryers, that this is the proper method of ventilating a machine room. It has shown increased drying capacities ranging from 15 per cent to 40 per cent, or when for any reason this is not desirable, a substantially reduced steam pressure. It also aids in uniform drying, reduces breakage about 60 per cent, eliminates wet streaks and cockle, puts more life in the sheet, resulting in better calendering, and all these advantages are secured without more cost for heat or air than if it were furnished through a roof system only. On fast running newsprint machines, book machines, etc., which have dryer felts, it is not very often that nozzles can be used and in these cases we bring the air down around the machine, partly up under the bottom felt, and partly in between the felts to approximate as far as possible the results, but without the use of cross nozzles.

There are no hard and fast rules in the design of these systems, and in every case the requirements peculiar to the individual mill must be considered. From an owner's standpoint, since it is possible to spend many times the first cost during every year of operation, it is vitally important that he be certain that these requirements have been considered, and that it is designed for the greatest economy possible in complete understanding of all factors that enter into it. He should also have in mind when his engineer figures the steam the system will use, that if the system is properly designed, it can not possibly affect or change his total steam consumption except for the better. This is now pretty generally understood, and is occasioned by the fact that all the air which is removed from the machine room must be replaced, and it must be heated somewhere from the outside temperature to the temperature at which it leaves the ventilators. It may be heated in an adjoining room, in a separate heater, by the dryers, or by steam coils, but in every case it is heated by steam, and I think there is no question but that this air could be much more economically heated in a heater properly designed and for this specific purpose. In the old days, which by way are not so old, a mill owner in purchasing a ventilating system, would often ask how much steam it would take, and when advised would often decide he could not afford to give that amount of steam, and would either abandon the idea or put in a smaller system. However this was (unless the system was terribly oversized), he was simply fooling himself, as he was going to use that steam and for that purpose anyhow.

It would probably be a great shock to many mills if they were to realize that it is probably taking 40 per cent as much steam to ventilate their room as to dry their paper, yet many mills are much worse than that. Accordingly the cost of an adequate and properly designed system is a part of the cost of doing business, and should be faced with a clear understanding of what it is, and with an equal determination that it shall be as economical as possible.

The next step is the utilization of the waste vapors passing from the ventilators for the purpose of heating the air supplied to the system. This is accomplished by means of an equipment developed under the Briner patent, and which consists of alternate systems of channels, through which the vapors pass horizontally, and the fresh air vertically down, the heat being transmitted through the walls of the machine to heat an equal volume of incoming fresh air. We all know the amount of steam required to turn the water in a sheet of paper into vapor, and by cooling this vapor to below the dewpoint, it condenses, thereby releasing this same heat of vaporization. In round numbers, for every pound of vapor condensed into water we obtain the heat equivalent of a pound of steam. We have hundreds of readings on a number of installations, and based upon readings in over eighty mills to determine an average temperature and humidity of vapors, we find that a rise in temperature from zero to eighty degrees then may be expected in these economizers on practically any installation, where it is physically possible to adopt the system.

As a more or less typical instance let us take that of a mill making 85 tons, and when the conditions require that 90,000 cu. ft. per min. pass through the machine room. In raising this volume from zero to eighty degree, through economizers, a saving of heat units equivalent to 119 pounds of steam per minute is made. This is 7,140 pounds per hour, and at 60 cents a thousand (substitute any more accurate figure), represents a saving of $4.28 an hour, $102.82 a day, or $15,423.00 in 150 days. On a test reading at another Canadian mill, we found the fresh air entering at 30 degrees below zero, and that it was being heated to 70 degrees, representing a saving of 214,840 pounds of steam on that day, and as well as the dollars and cents savings, it is usually a tremendous advantage in the very severe weather, when the boiler plant is at its peak load.

Another way to utilize the waste heat in these vapors is to draw them through sprays of water. These sprays cool and condense the vapors, and the heat released raises the temperature of the water very considerably. Tests made by a boxboard manufacturer show that the vapors passing out of their roof would heat all of their beater water from 40 degrees to 104 degrees.

We are only at the beginning of the real work that is necessary to secure economical ventilation of machine rooms, but there have been important advances made in the past few years.

Paper and Pulp Committee to Aid Forest Problems

How to help the United States Department of Agriculture work out its forestry program for the nation was the subject discussed at a recent gathering of prominent paper and pulp manufacturers who were invited by Secretary of Agriculture Wallace to form an advisory committee to meet with him and with representatives of the Forest Service.

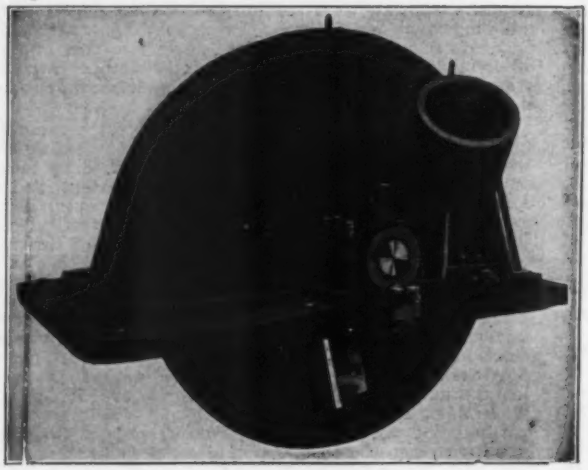
The committee of manufacturers voted to immediately lend its efforts toward better forestry and utilization of wood, and to aid in the development of a national forestry program. The committee will assist the department particularly in studying the local methods for growing timber suitable for pulpwood and better manufacturing processes.

One of the most urgent forest problems, according to the advisory committee, is for governmental agencies and the paper and pulp industry to work together to determine how much timber is available for paper making in the chief manufacturing regions, how long the supply of timber will last, and how to handle and protect the forests so as to keep them permanently productive.

Secretary Wallace in opening the meeting declared that "the paper and pulp industry is face to face with the critical problem of finding sufficient wood as raw material to meet the growing demand for paper.

"The Department of Agriculture's primary interest is in the raw materials that grow from the soil. Its traditional

Pulp and Paper Mill Machinery



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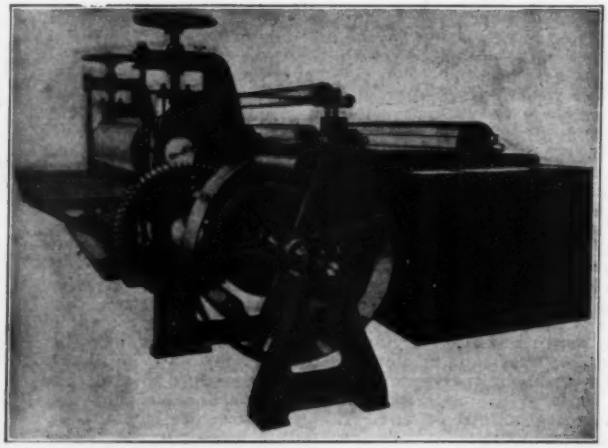

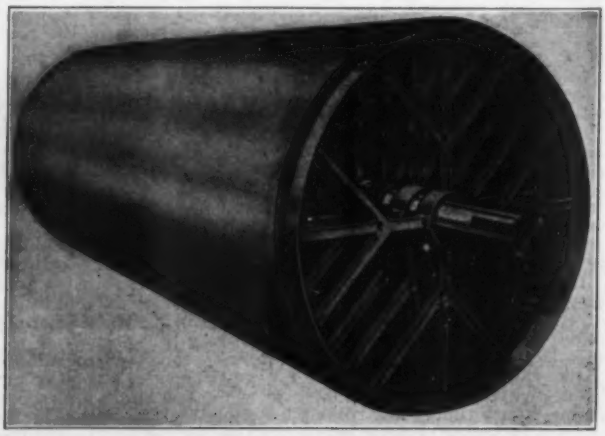

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interest is, of course, in the production of food, but in the past quarter of a century it has paid an ever-increasing attention to the production of timber. It recognizes reforestation as one of the country's great agricultural problems.

Problem Has Promising Side

"Serious as is the problem that confronts your industry, it has a decidedly promising side," continued Secretary Wallace. "In its raw material problem the paper industry is, despite present difficulties, peculiarly fortunate. In the first place, unlike coal or iron or copper, wood grows from the soil. In the second place, the p aperindustry can use small, quickly grown and, therefore, relatively cheap timber. Indeed, it will ultimately come to rely chiefly on thinnings and waste, the mere by-products of intensive timber growing and utilization.

"Once we fully abandon the old psychology of timber mining; once we renounce the doctrine of an ever-fiercer competition for an ever-diminishing raw material; once we pin our faith to the never-ending productivity of the soil, the paper industry can meet its needs and its opportunity."

Research of Great Value

The value of scientific research in forestry problems and the utilization of wood were emphasized by those present at the meeting. One of the definite accomplishments of the meeting was the decision to have small groups of timberland owners act in an advisory capacity to the Federal forest experiment stations at New Orleans, La.; Asheville, N. C.; Amherst, Mass.; St. Paul, Minn., and to the Forest Products Laboratory at Madison, Wis.

Colonel W. B. Greeley, chief of the Forest Service, declared that the difficulties of reforestation are greatly over-exaggerated.

"Private reforestation is now economically feasible in many parts of the South and East," said Colonel Greeley. "The trouble is that too many private owners are over-cautious and over-conservative in embarking on timber growing. The proper function of the Federal Government is to aid private enterprise by removing the obstacles to timber growing. The main steps needed are to aid the States in protecting wooded areas against fire, to relieve forest land from unfair taxation, to make cheap nursery stock available, and to educate all land owners in tree-planting and timber growing. These steps are embodied in legislation now ending before Congress."

Agencies Must Work Together

"The paper and pulp industry can not turn its raw material problem over to the Federal Government," said Hugh P. Baker, secretary of the American Paper and Pulp Association. "The industry must spend its own money and create its own leadership to work out this problem, getting the help and advice of the Forest Service.

"The Federal Government will probably have to acquire at least one-third of the forest land of the country, but private initiative will have to be depended on to properly handle the other two-thirds of our forests, and will have to undertake this task in the very near future."

Norman W. Wilson, of the Hammermill Paper Company, stated that the paper and pulp industry is now among the six largest in the country.

"In 1889," Mr. Wilson said, "this country produced about 2,100,000 tons of paper, and in 1923 the production was 7,200,000 tons. This increase has placed the United States in the leading position among the countries of the world. However, the future of the paper industry in this country depends upon our ability to compete with other nations for our own markets and for foreign markets, and we believe our ability to compete depends upon our ability to acquire or produce our principal raw materials.

"The manufacturers who cut from their own land or from leased property are developing forestry organizations, and many are making a study of the feasibility of producing forests as near to their own factories as that can be done."

George W. Sisson, of the Racquette River Paper Company, declared that the "greatest co-operative effort of the paper industry with the Forest Service of the Agricultural Department should be along forestry lines. The absolute dependence of the industry upon wood fibers, their rapid depletion in this country, and the probable increasing difficulty of securing outside supplies, makes this the major problem of the industry today. The paper industry stands ready to co-operate with Federal forestry officials in the adoption and carrying out of a wise forestry policy intended to serve the needs of all the public."

Experimental Work Discussed

Samuel T. Dana, director of the Northeastern Forest Experiment Station, and Raphael Zon, director of the Lake States Forest Experiment Station, discussed the work of their stations relating to the growing of pulpwood. The main producing regions of timber best suitable for pulpwood lie within the territory covered by these two forest service stations.

Carlile P. Winslow, director of the Forest Products Laboratory, spoke of the technical work relative to papermaking properties of various woods, the elimination of waste in manufcature, and other paper and pulp studies made at the Laboratory. Charles W. Boyce, in charge of paper and pulp statistics for the Forest Service, took for his subject the "Economics of Paper and Pulp." Mr. Boyce urged more detailed studies of existing stands of pulpwood forests, costs of growing timber, taxation, and related problems.

George N. Ostrander, of the Finch-Pruyh Company; D. C. Everest, of the Marathon Paper Mills, and W. G. McNaughton, of the Technical Association, also presented papers dealing with the problems of the industry and the aid to be given by the Forest Service. Each emphasized the necessity of keeping forest lands productive and preventing waste in manufacture, and the need for enlarging all branches of forest research. Mr. Ostrander particularly emphasized the need for a timber survey in the Northeast.

Those at the meeting as representatives of the paper and pulp industry included Hugh P. Baker, George W. Sisson, Jr., Henry W. Stokes, Grellet Collins, D. C. Everest, H. E. Fletcher, A. C. Goodyear, Charles W. Luke, George N. Ostrander, Norman W. Wilson, M. E. Marcuse, I. J. Marcuse and W. G. McNaughton.

Representatives of the Forest Service and Department of Agriculture included Secretary Wallace, Colonel W. B. Greeley, Earle H. Clapp, Raphael Zon, Samuel T. Dana, Carlile P. Winslow, John D. Rue, Charles W. Boyce, E. N. Munns and Ward Shepard.

New England News

Boston, Mass., March 1, 1924.

Strike May Affect Imports

The strike of paper and pulp mill workers in Norway may sooner or later have a noticeable effect on the importation of mechanical woodpulp which has been coming to this country in steadily increasing quantities throughout the past winter. Arrivals of ground woodpulp on a large scale at Boston have been a comparatively recent feature, for during the greater part of last year the Scandinavian mechanical pulps were quoted at decidedly higher prices than the domestic or Canadian product, although the reverse was true of the chemical pulps.

Several lots have arrived on recent steamers at Boston, that is during February, the aggregate for the month having been close to 20,000 bales. It is reported that some foreign mechanicals have been offered as low as $29 ex docks Boston or Portland. New England pulp makers expect to offset this low priced material through reduced manufacturing costs this season which will include a marked reduction in pulpwood prices.

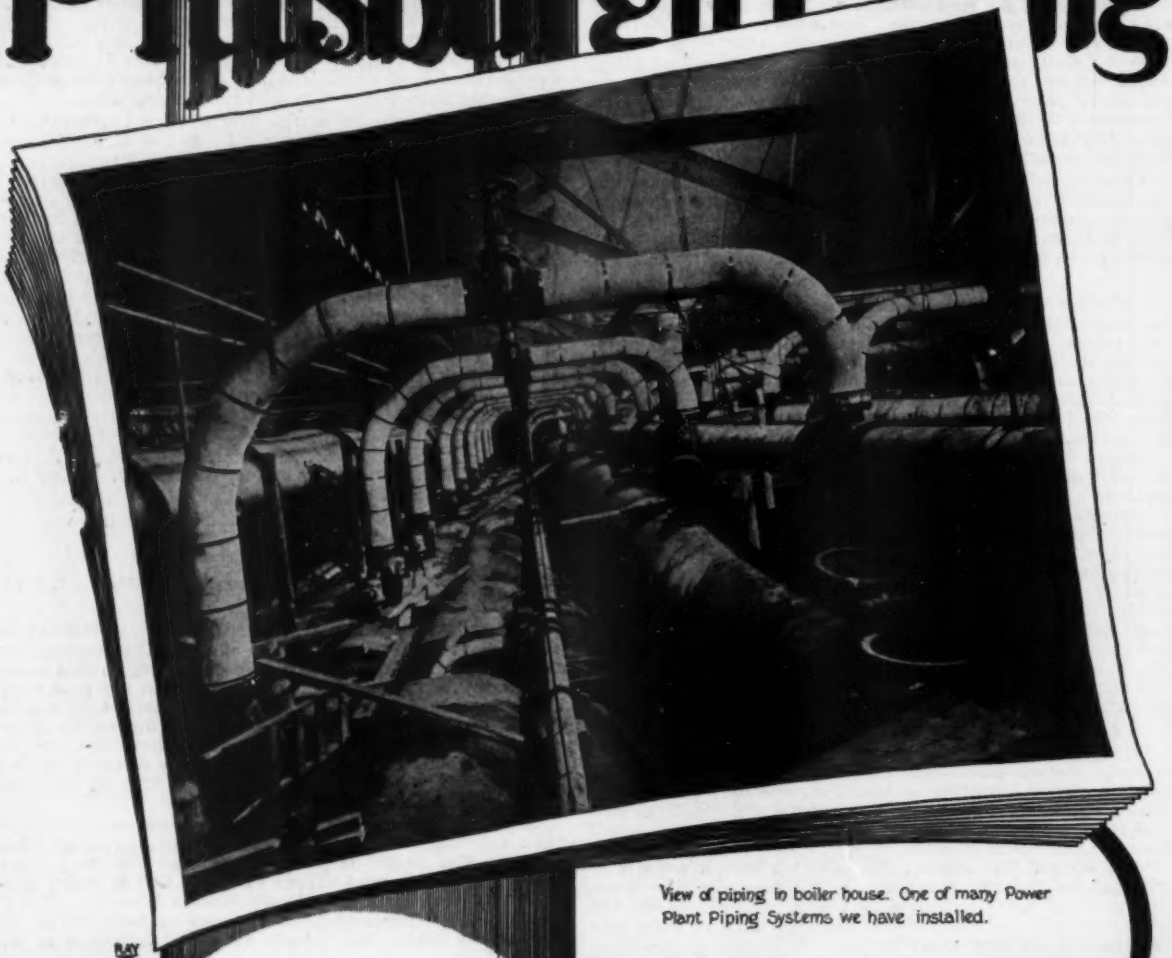
Coal vs. Oil for Paper Mills

Between thirty and forty purchasing agents of paper mills were among some 500 New England mill men who attended a conference at the City Club, Boston, Wednesday afternoon and evening, February 13, arranged by the New England Wholesale Coal Association. The purpose of the meeting was to combat the use of fuel oil as an industrial fuel and to indicate that by the use of modern stoking methods coal was a cheaper and better fuel in the industrial boiler.

The meeting was addressed by leading engineers of the country. Perry Barker, former high official of the Bureau of Mines, former state and city coal analyst for Massachusetts and Boston and at present a leading fuel chemist, discussed the relative value of coal and oil in stationary boilers. He indicated that from handfired boilers a 63 percent efficiency can be expected in the average boiler; from automatic stokers, a 74 percent efficiency, and from pulverized coal burned in special apparatus an 80 percent efficiency is common. On this basis and allowing for a 77 percent efficiency in oil, and for B.T.U. of 31.92 million per gross ton of New River coal, and 6.18 million for a barrel of oil, a plant engineer could expect to get the equivalent in heating value of 5.17 barrels of oil from a gross ton of coal. Figured on a price basis with oil costing $1.65 per barrel at New England seaboard cities, he declared that coal could cost $8.18 gross ton on cars seaboard points and still be as cheap as oil. As a matter, Mass., gave an extended talk on automatic stokers, illus-

F. H. Daniels of the Sanford Riley Stoker Co. of Worcester of fact New River coal sells for about $6.15 on cars New England ports.

Pittsburgh Piping



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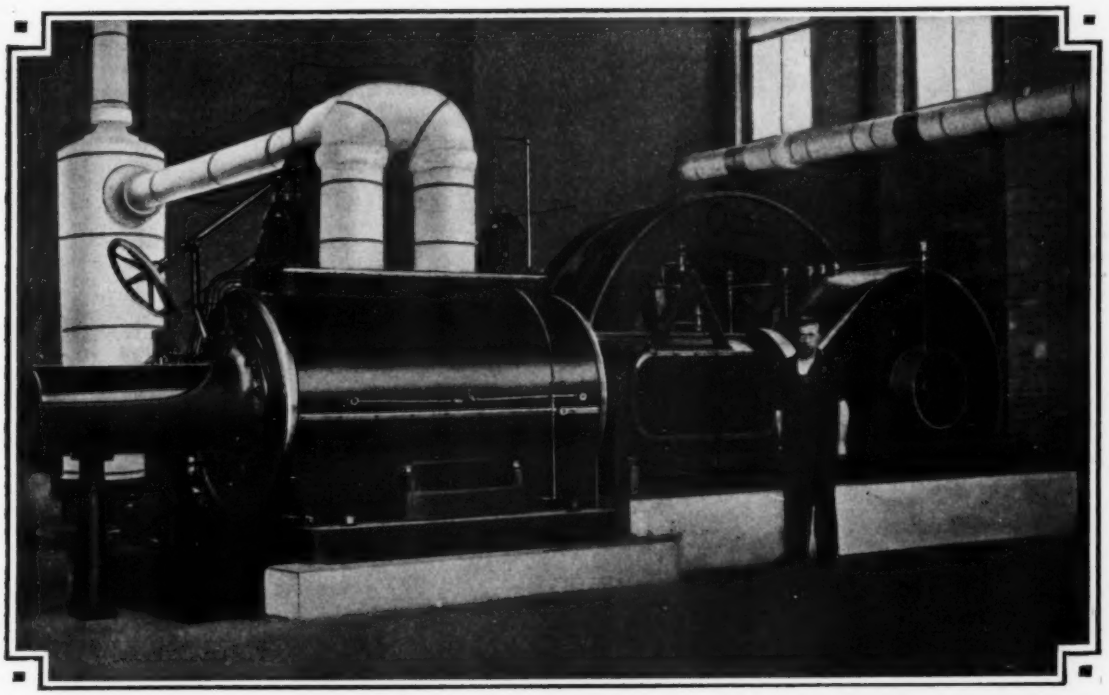


A 28"x36" Nordberg Uniflow engine of 1350 I. H. P. direct connected to a 1125 K. V. A. generator installed in the woodworking plant of Carr, Ryder & Adams Co., Dubuque, Ia. This engine operates with high back pressure and under conditions similar to those required for paper mill operation; the exhaust steam being used for lumber drying.

Power Economy for the Paper Mill

THE ability of the Nordberg Uniflow Engine to operate under the most unusual steam conditions renders it especially suitable for paper mill drives. When operating under high steam pressure and superheat as is the present-day tendency, against excessive back pressure, or with a widely varying load, this modern engine shows a remarkably flat economy curve and uniformly low steam consumption.

The design and construction of the Nordberg Uniflow Engine is of the same high degree as that which has always characterized Nordberg steam engines. Valves that are designed and constructed to stay steam tight indefinitely, floating piston, provision for either condensing or non-condensing operation and many other features make these engines supreme for paper mill service. A large variety of sizes and types permits the selection of an engine most economical for the requirements.

Many existing mills are adopting this form of power, materially reducing production costs. May we serve you with our free engineering service? Bulletin RY-1 explains the technical details of this most economical engine. Send for it today.

Nordberg Manufacturing Company

Milwaukee, Wisconsin

NORDBERG MACHINERY

Uniflow Engines *Corliss Engines*
Condensers *Compressors*

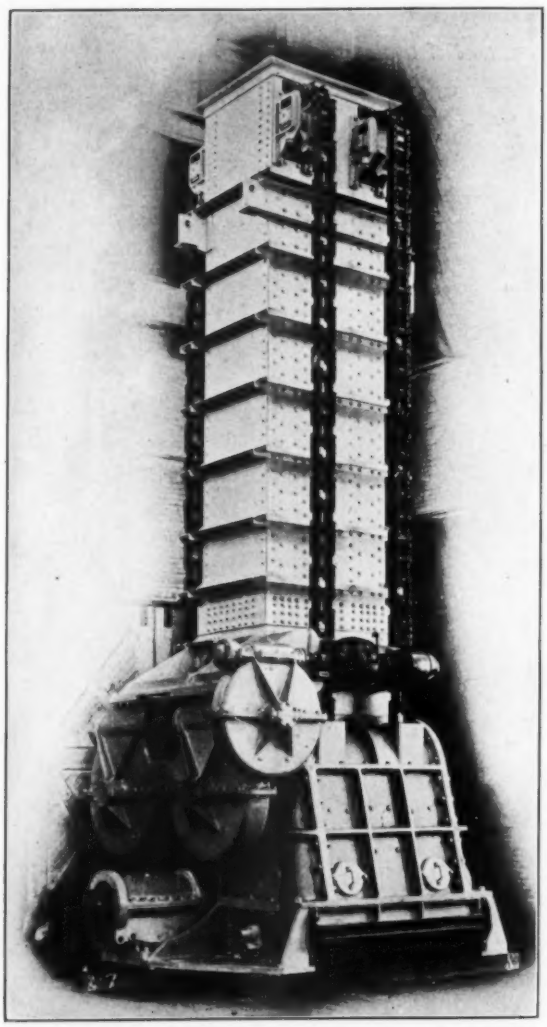
Blowing Engines *Diesel Engines*
Mine Hoists *Special Machinery*

Warren Continuous Magazine Grinder

Reduced Labor Cost

Less Jigging

Lower Power Cost



Greater Production

More Uniform Pulp

Lower Stone Cost

This Grinder is now producing more than 25 tons of pulp per day and requires less than 50 h. p. per ton of pulp

Manufactured in U. S. by
THE BATH IRON WORKS, Ltd.
Bath, Maine

Manufactured in Canada by
CHAS. WALMSLEY & CO. (CANADA) Ltd.
Montreal

trated by a moving picture showing the actual burning of coal in a furnace stoked automatically.

Following dinner, at which the visiting industrialists were guests of the coal association, Henry Kreisinger, formerly a leading engineer of the United States Bureau of Mines and now of the Combustion Engineering Co. of New York, spoke on "Pulverized Coal for Power Plants," profusely illustrating his talk with stereopticon views of a number of such installations. The closing talk was delivered by Professor Edward F. Miller, head of the Department of Engineering of the Massachusetts Institute of Technology, on "Fuels in General."

Brown Corp. Floats Big Stock Issue

The Brown Corporation, incorporated under laws of the Province of Quebec, a subsidiary of Brown & Co. of Berlin, N. H., and Portland, Me., successfully floated an issue of $2,000,000 7 percent cumulative preferred stock. Brown Corporation owns and operates a large sulphate pulp mill at La Tuque, Quebec, the entire output of which is absorbed by the American company.

The timber holdings of the Canadian subsidiary have been enlarged to 5,000 square miles, an area as large as the state of Connecticut, containing over 12,000,000 cords of pulpwood, together with 140,000 undeveloped horsepower in waterfalls. There is 4,400 horsepower developed waterpower.

Fifteen paper and pulp mill companies, members of the New England Paper and Pulp Traffic Association, obtained a hearing before the Public Utilities Commission of Maine on February 28, for the purpose of protesting the recent advance pulpwood rates on the Maine Central R. R. which went into effect on February 5. Protesting that three radical increases had been previously put into effect since 1914 on this rate structure, the mills declared that the new rates were unfair, prejudicial, and asked for reparation for increased rates already paid.

A meeting of stockholders of the Continental Paper & Bag Mills held in the Fidelity Trust Building in Portland formally consummated the transfer of the company's assets to the new Continental Paper & Bag Mills Corporation, a Delaware corporation with the International Paper Company owning 50 percent of the common stock, all of the prior preference preferred and 70 percent of the participating preferred. The transfer of title to the Continental Paper & Bag Corporation of the International Paper Co.'s mill at Rumford, Me., was also voted at this meeting.

For the purpose of improving and enlarging their plant, and to refund maturing obligations the Parker Young Co. of Boston, operating a paper and pulp mill at Lincoln, N. H., and a ground wood mill at Livermore Falls, N. H., issued $2,500,000 of first mortgage sinking fund bonds. The company has unusual facilities for handling its pulpwood. Its mill at Lincoln is connected by a 20 mile logging railroad with 70,000 acres of timberland owned by the company. It is understood the company intends to acquire additional stumpage with part of the proceeds of this bond issue.

A decision from the Interstate Commerce Commission was received by the Monadnock Paper Mills of Bennington, N. H., which provides for satisfactory reparation on overcharges on pulpwood shipments. The wood moved from Yarmouth over the Grand Trunk to Portland, thence over the Boston & Maine at the joint applicable sixth class rate of 22.5 per hundred pounds. Reparation was sought and obtained to the basis of a commodity rate of 18 per hundred pounds subsequently established.

The acid plant of the Oxford Paper Company of Rumford, Me., was damaged by fire on February 10. The fire was in the sulphite department of the plant, but while considerable loss was entailed it did not spread to other buildings, owing to the prompt response of the mill fire crew. The Oxford Paper Co. mills are equipped with every standard facility for fighting flames, including alarm system, standard hydrants, and water guns fitted with pumps to draw water from the river.

To further increase the scope of their organization and its effectiveness in supplying the owners with pulpwood the directors of the Kennebec and Moose River Log Driving Companies met at Augusta, Me., recently. Officers were elected for both companies. Directors included Fred A. Gilbert of the Great Northern, F. H. Colby of the S. D. Warren Co., President Everett J. Lanigan, and others.

Hollingsworth & Vose Co. report a surplus account for the end of the year 1923 of $1,324,000, which compares with a surplus of $911,575 at the close of 1922. They also showed on their balance sheet a reserve account of $79,000, which was not held at the close of 1922. It is generally understood that operations for companies in the rope paper business were extremely favorable last year.

Comparatively mild weather conditions during a large part of the past winter have been the cause of low priced casein, according to local milk producers. A glut in the market of milk byproducts was announced in Boston at a recent meeting of the New England Milk Producers Association. Low priced domestic casein has resulted in a marked curtailment of imports from South America and Australia.

The Bath Iron Works of Bath, Me., during the war manufacturers of engines and parts for the Navy and since then producers of paper mill machinery, are understood to be in bankruptcy. Receivers have been appointed and the property will probably be liquidated. A report that the General Electric Co. was to buy the plant is unfounded, according to officials.

The Pejepscot Paper Company is completing the installation of powdered coal burning apparatus at a second of its four mills. The design of the second installation is somewhat different from that of the first. The first was the well known product of the Erie City Iron Works and was installed at the Pejepscot plant. We understand the second installation is at Brunswick.

The Poquonock Paper Company of Windsor, Conn., has been incorporated with $300,000 capitalization. According to papers of incorporation the company is to manufacture pulp and "other wood fibre products." The incorporators are William S. Kenyon, Donald C. McCarthy, and Vincent W. Dennis, all of Hartford.

The present year is the 75th anniversary of the founding of the L. L. Brown Paper Co. of Adams, Mass. Suitable recognition of this event will take place later in the year. The company has issued its 75th anniversary calendars, which are already familiar adornments on office walls in New England.

During the recent bull market in paper making rags the highest prices attained anywhere in the country were reached in Chelsea, Mass., the New England rag center. It is understood that dealers paid $3.25 per 100 pounds for roofing rags.

Fire of undetermined origin destroyed the paper stock warehouse of the Davis Paper Co. of West Hopkinton, N. H., the second serious fire which this mill has suffered within six months. The loss was but partly covered by insurance.

Permission to issue $150,000 trust certificates to purchase pulpwood has been granted W. S. Wyman and other trustees for the bankrupt Cushnoc Paper Co. of Augusta, Me.

New York City News

New York, March 1, 1924.

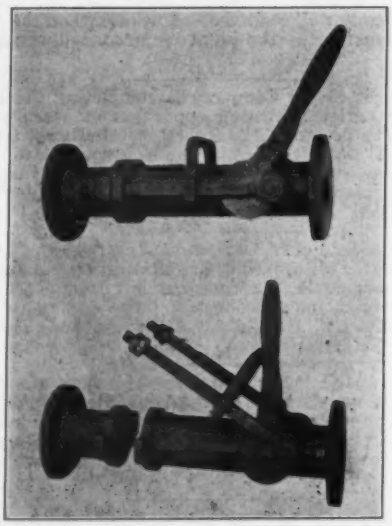
Wood Pulp Importers Elect Officers

At the annual meeting of the Association of American Wood Pulp Importers, held at the Uptown Club on February 7, A. J. Pagel, of Pagel, Horton & Company, of New York, was elected president for the ensuing year. Other officers elected were: Vice President, J. F. Patton, of J. F. Patton & Company; Secretary, Orval A. Wales, of Johaneson, Wales & Sparre, Inc., and Treasurer, O. Hylin, of the Lagerloef Trading Company.

These officers, together with William H. Anders, of the Perkins-Goodwin Company, compose the Board of Directors of the association. H. E. Atterbury, of Atterbury Bros., Inc., was elected National Councillor, and J. A. Millar, of the Scandinavian Pulp Agency, Inc., was elected Substitute National Councillor.

The domestic and export machinery and paper mill supply business conducted by the late H. B. Wadsworth at 51 East Forty-second street, New York, will continue to be operated by his widow, Mrs. Jessie B. Wadsworth, under the firm name of H. B. Wadsworth, Inc. Mrs. Wadsworth is familiar with the paper and pulp trade, as for over seven years she handled all the office details of her husband's business and traveled considerably among the mills during that period. Asso-

Shevlin's Quick Opening Acid Bronze Relief Pipe Connection for Sulphite Digesters



These Quick Opening Relief Pipe Connections give a simple and easy method for connecting and disconnecting the digester relief lines when filling digesters.

They are designed on generous lines, and the metal used is the same acid resisting bronze which enters into the construction of the "Shevlin" Valves.

No nuts to be taken off and lost.

No bolts to be looked after.

Simply insert a sheet of sulphite as a gasket, punch a hole in it, swing the handle over into place and the job is done.

Also

Shevlin's Standard Improved Blow Off Valves, Special Acid Valves for General Use in Sulphite Mills and Acid Resisting Bronze Fittings.

We also make the well known

TRIMBEY AUTOMATIC CONSISTENCY REGULATOR

of which there are more than 260 in use, and the

TRIMBEY AND TIBBITTS PROPORTIONING AND METERING SYSTEM

which meters each ingredient going into the paper mixture, thus insuring a uniform mixture, true in color and with a saving in power and labor to more than pay the total cost of installation the first year.

Ask us to have our Engineer furnish you an estimate showing what savings you can make.

Also made in Canada.

TRIMBEY MACHINE WORKS

GLENS FALLS, NEW YORK

ciated with Mrs. Wadsworth in the conducting of the business is C. W. Quinn, who is well known in the trade through his former connections with the Craig-Becker Company and R. F. Hammond, Inc.

Fred H. Chase, formerly of Chase & Norton, Inc., of New York, and one of the deans of the waste paper trade in the metropolitan district, is now associated with Daniel M. Hicks, Inc., dealers in and importers of papermakers' materials of 200 Fifth avenue, New York. The firm of Chase & Norton, Inc., was recently dissolved after 26 years in business, but under Mr. Chase's new connection with the Hicks company he will retain the waste paper packing house formerly conducted by Chase & Norton, Inc., which will enable Daniel M. Hicks, Inc., to increase their output of high grade waste paper and render even more efficient service to their customers than in the past.

The Waste Merchants' Association of New York, whose membership includes practically all of the concerns in the metropolis dealing in paper mill supplies, has decided on April 9 as the date for its annual dinner, which will be given as heretofore in the Hotel Commodore. This date is during the week of the paper manufacturers' convention in New York, and the dinner is always one of the events of the year in the trade. The usual high-class vaudeville entertainment will follow the dinner. Walter R. Martens, of George W. Millar & Company, Inc., 284 Lafayette street, New York, is chairman of the arrangements committee.

The Hartig Pulp Company, Inc., of 247 Park avenue, New York, has been organized as a branch of Hugo Hartig, Inc., of Stockholm, Sweden, and Hugo Hartig, of Hamburg, Germany, and to represent in the United States a part of the agencies intrusted to the parent companies abroad. Hugo Hartig is president of the New York concern, Marvin Preston is vice president, and Kenyon Harris, formerly of the American Woodpulp Corporation, is secretary.

Frank Branscombe, for the last nine years with Gosling & Farr, Inc., box board dealers of 141 Wooster street, New York, and formerly secretary of that concern, has severed his connection with that firm to become associated with Charles M. Mead in the New York office of the Philadelphia Paper Manufacturing Company, board manufacturers, with mill in Manayunk, Pa.

John H. Engelke has severed his connection with Salomon Bros. & Company, importers of papermakers' supplies of 200 Fifth avenue, New York, to become associated with the Whaling Waste Products Company, Inc., of 290 Broadway, New York, for which concern he will establish a foreign papermaking rag department.

A petition in bankruptcy was filed recently against the United States Paper Manufacturing Corporation, of 17 East Forty-second street, New York, by Bulkley, Dunton & Company, creditor for $10,000; the State Bank, $5,000, and S. D. Leidesdorf & Company, $200. Charles A. Marshall was appointed receiver under $10,000 bond by Judge Winslow.

Charles B. Foster has severed his connection with the sales department of the Pejepscot Paper Company, of Brunswick, Me., to become associated with the Carpenter Container Corporation, of 1 Broadway, New York. Mr. Foster was formerly assistant general sales manager of the American Writing Paper Company in Holyoke, Mass.

A. A. Silverton, formerly in business handling rag stock and other paper mill supplies under the name of A. A. Silverton & Company, Inc., of New York, is now with Isaac Minsky, dealer in cotton cuttings of 200 Fifth avenue, New York.

Warren Webster & Co., of Camden, N. J., manufacturers of steam-heating systems, feed-water heaters and steam specialties, have moved into their new plant at Federal and Seventeenth streets, Camden.

The Continental Paper and Bag Mills, Inc., will remove their New York offices shortly from 16 East Fortieth street to the Pershing Square Building, 100 West Forty-second street. The name of this company has been changed to the Continental Paper and Bag Mills Corporation.

The Canadian Export Paper Company, Ltd., of Montreal, has leased offices in the Park-Lexington Building in New York for its Eastern executive headquarters.

Cleveland Worm Gear Reduction Unit applied to 14-inch Conveyor. Motor 20 H. P. at 680 R. P. M. Ratio in worm drive 16 1-3 to 1.

Lower Maintenance Costs

The demand today and for the coming year is for lower maintenance costs.

Labor, materials and other items not under control have forced even closer scrutiny of those items that can be governed. The competition of the times demand that, where possible, overhead be reduced.

In your considerations we invite attention to Cleveland Worm Gear Speed Reduction Units as a factor in reducing repair costs.

They will reduce repair costs for the units themselves and also for driven machinery. We make this statement after careful analysis of the experiences of many plants in widely divergent lines of manufacture.

We feel perfectly safe in promising you lower repair costs if you will adopt Cleveland Worm Gear Drives.

Greater compactness, freedom from vibration, evenness of torque, maximum silence, right angle drives, savings through standardizing on high speed motors and less unproductive help are all practical advantages of this form of drive.

Further information will be gladly supplied and full engineering co-operation, if you will write.

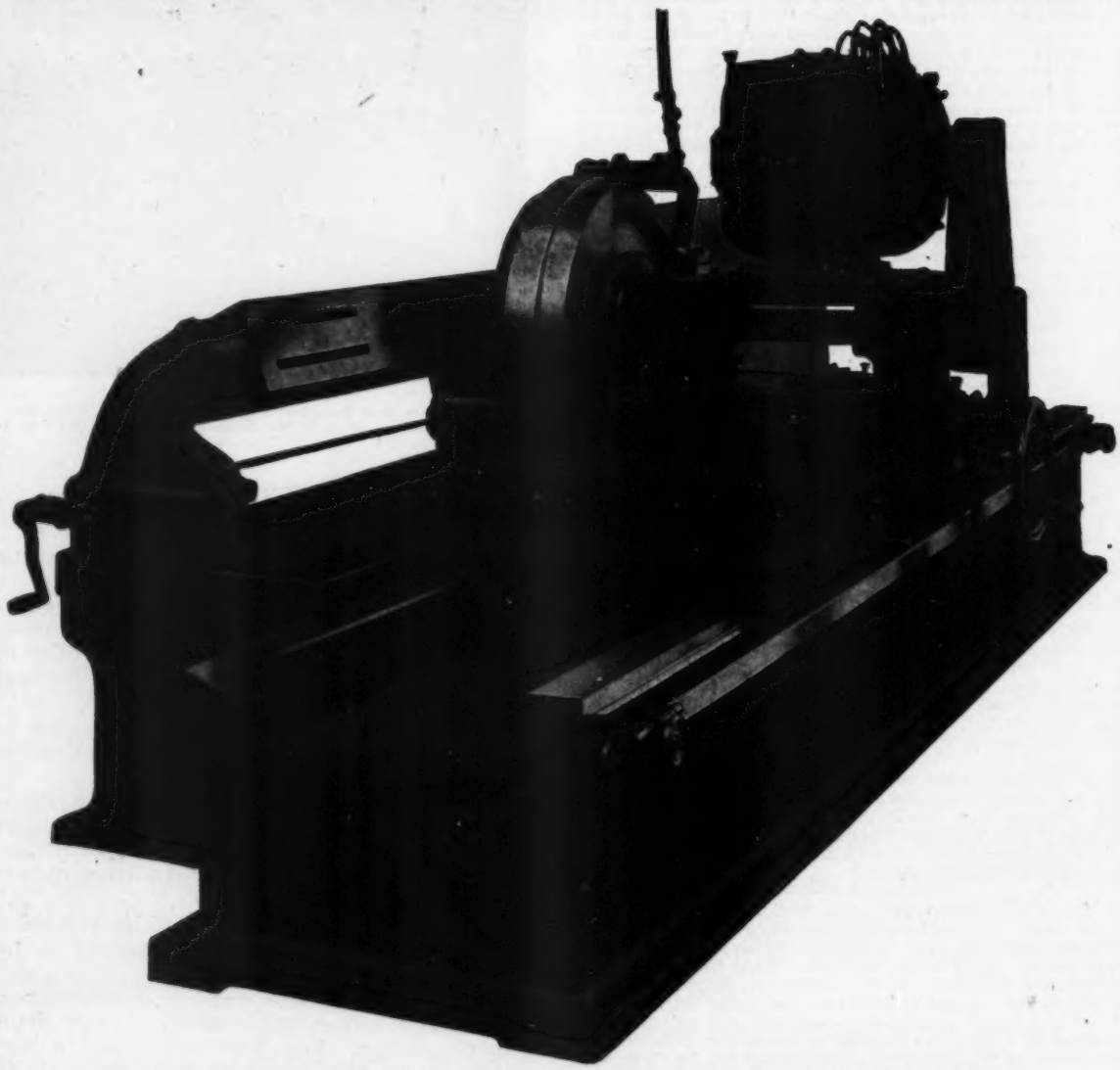
The Cleveland Worm & Gear Co.

America's Worm Gear Specialists

CLEVELAND, OHIO

Cleveland
WORM GEAR
REDUCTION UNITS

KNIFE GRINDING SERVICE



Most Accurate, Durable, Economical Grinder Manufactured

Saves floor space, saves upkeep expense, saves in original investment. Our latest developments in full automatic grinding of paper knives embody the most compact, massive, and lasting type of construction yet developed in this class of service. Simple design, few parts to wear, yet full automatic and accurate to the highest degree.

All types of grinders for all kinds of service. For latest developments in economical, accurate knife grinding service, apply to

MACHINERY COMPANY OF AMERICA

BIG RAPIDS, MICH., U. S. A.

Northern New York

Watertown, N. Y., March 1, 1924.

The Taggart Brothers Company, owners of a paper mill on Black River, have served notice on City Manager J. Walter Ackerman that they consider that the old Court street bridge, an iron structure which fell into the river while being wrecked, is a menace to their rights, and ask that the city take steps to remove the bridge at once. Ice failed to hold the bridge when it was cut loose from its piers and it dropped to the bottom of the river, about two-thirds of the structure being submerged. The old bridge is located only a few rods above the Taggart dam, and while the danger from ice carrying the bridge downstream and damaging the dam is considered remote, the company believes that structure stops the flow of water to an extent that many units of horsepower will be lost to them.

Recommends Sale of Carthage Sulphite Mill

Immediate sale and disposal of all of the assets of the Carthage Sulphite Pulp & Paper Company will best conserve the interests of the creditors, is the recommendation of Attorney Charles E. Norris, receiver for the bankrupt concern. Federal Judge Frank Cooper has granted the motion of Attorney Francis E. Cullen, solicitor for the receiver, directing all creditors and persons interested in the receivership proceedings to appear at Utica, N. Y., March 7 at 1 p. m., and show cause why the petition of the receiver for immediate sale of the property shall not be granted.

Receiver Norris sets forth in his petition his belief that it is impracticable to operate the plant and that any attempt to do so would only result in loss to the creditors. He points out in addition that it is impossible to borrow sufficient funds properly to finance the company, either for temporary or permanent operation. An investigation of the books of the concern for the four years prior to Dec. 31, 1923, shows that with the exception of 1920 the company lost money each year. The loss for the calendar year of 1923 as shown by the books was approximately $152,000.

Assets of the company amount to $605,342, according to the report of the appraisers filed with the federal court Feb. 28. The appraisal was made by James F. Aiken of Ogdensburg, Charles Burroughs of Little Falls and Frank L. Moore of Watertown.

The assets include seven acres of land valued at $15,000; seven houses, $9,736; water power rights in dam on Black River, $211,869; flume and water power developed, $14,400; paper mill, $44,591; ground wood building, $8,356; pulp mill machinery, $69,970; machinery in ground wood department, $28,970; truck, furniture and fixtures, $3,536; machinery in sulphite mill, fire damaged, $24,152; miscellaneous equipment, $8,000; supplies, $51,023; paper, $2,400; account from Disher Paper Company, $949; life insurance to be received, $23,445; Black River Regulating district, $500; insurance money held by U. S. Mortgage & Trust Company, $42,012; and one-sixteenth interest in Mt. Louis P. W. property, $25,000.

The water power consists of 736 continuous horse power at 75 percent factor and 203 second class horse power at 75 percent factor, of a total value of $211,869. The first class power is valued at $40 and the second class at $15. Deducting the cost of development, $58,601, and capitalized on a 10 percent basis, the $211,809 is reached.

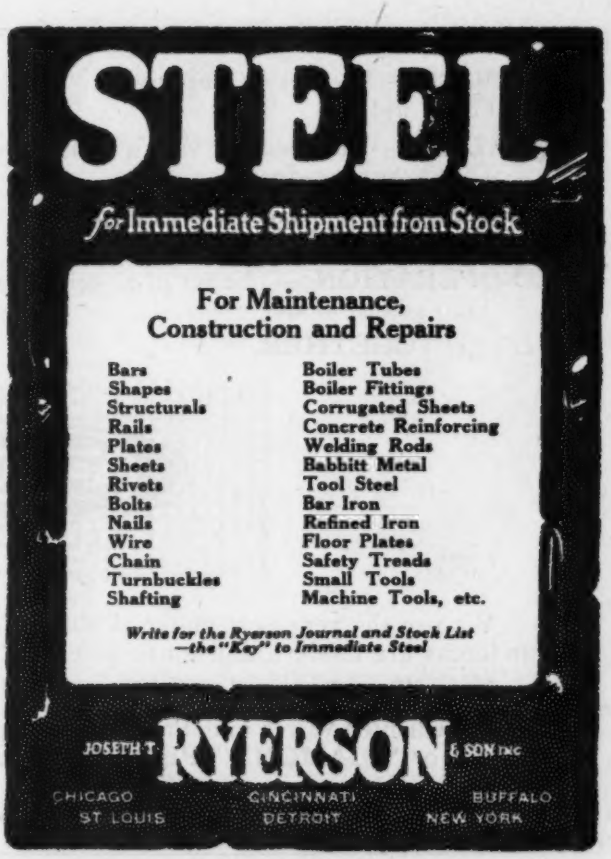
The grand indebtedness of the firm amounts to $1,000,500, according to the receiver's petition. It is predicted that the bond holders and a small coterie of secured creditors will realize on their investment, with no hope for other creditors realizing anything. Bonds outstanding are said to amount to about $560,000. There are five secured creditors with claims of $34,103.81 and unsecured creditors, 237 in number, with claims of $405,992.75.

Many northern New York paper mills, banks and coal companies are among the unsecured creditors.

New Species of Poplar

The New York State College of Forestry at Syracuse, N. Y., makes the announcement that propagation of a new species of poplar tree known as the "sudden Sawlog" may have a big effect on the woodpulp industry. The Sawlog poplar grows with great rapidity.

Experiments conducted by the college show that a tree planted in May, 1916, approximately eight years ago, has reached the remarkable dimensions of 50 feet high with a circumference at the base of 3 feet 3 inches and a resultant diameter at the base of about one foot. The ordinary spruce tree familiar to this locality would require 50 years to complete a like growth, said college officials.



FLEXCO
Lamp Guards
The Mill Type Guard
Illustrated above is the new FLEXCO-LOK Mill Type Lamp Guard.
This addition completes a line of re-enforced, expanded metal guards that is superior in service, appearance, safety and proper distribution of light.
If your jobber can not supply you, a letterhead request will bring sample and prices. Give lamp size and socket diameter next to or between shade holder rings.
FLEXIBLE STEEL LACING CO.
4675 Lexington Street, Chicago, U. S. A.

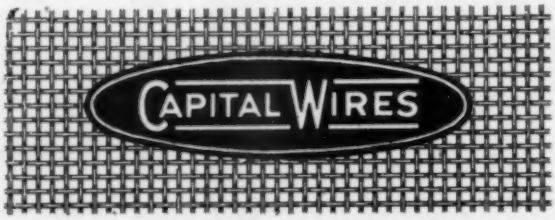
SERVICE;—The act of serving.
That's us!

QUALITY;—The element which makes anything distinctly superior.
That's our product!

DECISION;—The act of forming and announcing a judgment.
That's your part!

CO-OPERATION;—The act of co-operating or working together for mutual benefit.
That's both of us!

Let's get **TOGETHER.**



We use the very best material obtainable for the manufacture of our product and our looms are modern and up-to-date.

We will stock your sizes without any obligation on your part.

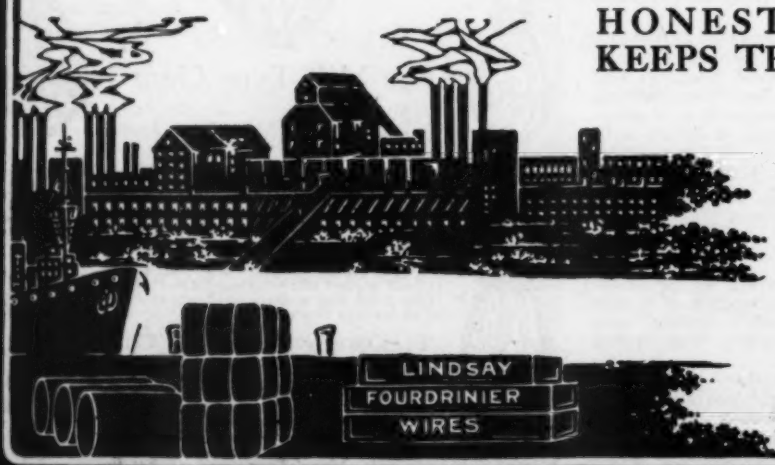
Fourdrinier Wires and Paper and Pulp Mill Wire Cloth of every description in **BRASS** or **"DIAMOND" PHOSPHOR BRONZE.**

Capital Wire Cloth & Mfg. Co., Ltd., Ottawa, Canada

Real Merit Placed

Lindsay Fourdrinier Wires

In Many Mills



HONEST SERVICE KEEPS THEM THERE

They are ready to serve you

The Lindsay Wire Weaving Company

Collinwood Sta., Cleveland, Ohio

"Ask any Papermaker"

International Closes Down

The mills of the International Paper Company in the Watertown district have been closed down for an indefinite period. Allen Curtis, vice president of the company, announced that the reason for the closing down was "general conditions in the industry."

The International had three mills in the Watertown district, located at Glen Park and Brownville, suburbs of Watertown. One of the mills has not been in operation since the strike of 1921, but the other two have been in operation part of the time. They have been running for several months and the shut down leaves 300 or 400 men without employment.

According to information received here the plants of the International at other points will remain in operation.

Production of the Algonquin Paper Company's mill at Ogdensburg, which has been in operation only about a year, is being steadily increased. Production during the week ending Feb. 23 averaged 85 tons daily and on two days 90 tons were turned out. New calender stacks are now being installed by the Bagley & Sewall Company of Watertown, which will be completed within the next few days, still further increasing the production, it is expected. The new stacks will increase the width of the rolls from 194½ inches to 198 inches.

James C. McCormick, assistant treasurer of Knowlton Bros., Inc., of Watertown, N. Y., and his daughter, Miss Elizabeth McCormick, sailed Feb. 23 from New York for New Orleans. Mr. McCormick plans to make an extensive tour through the southern states, calling on the southern trade of the paper company and establishing connections in the state of Texas, a district which has not been worked extensively. The trip will require about four weeks.

Thomas Woods has resigned his position as general superintendent of the Oswegatchie Paper Company at Natural Dam, St. Lawrence County. John F. Carroll of New York succeeds him. The plant has been in operation about a year and is rapidly expanding its business. About 100 men are employed in the mill, which is turning out newsprint.

Clark DeFriend, formerly of Watertown, N. Y., who has been master mechanic at the DeGrasse Paper Company's mill at Pyrites for the past few years, has resigned. Mr. DeFriend was tendered a banquet by his fellow workers Feb. 11. His plans for the future are indefinite.

Fremont W. Spicer, many years ago superintendent of the Frontenac Paper Company at Dexter, who has been recovering from an attack of pneumonia at his home at Kew Gardens, Long Island, has suffered a relapse, according to word received here. For many years Mr. Spicer was connected with Fourth Estate, a journal of the newspaper trade.

John P. Smith of Beaver Falls, N. Y., for 43 years an employee of the J. P. Lewis company, and said to be the oldest paper mill superintendent in the state, died at his home, Feb. 26.

A new company which has recently been organized by H. P. O. Newstrand, Greenwich, N. Y., is making plans for the erection of a one-story building.

Ohio News

Middletown, O., March 1, 1924.

New Electric Driven Mill

J. R. Stevens, the general contractor of the new Frank Smith Paper Mill, is pushing the construction of the mill with all possible speed and much of the machinery is on the ground awaiting erection.

The mill was designed largely by Frank Smith, general superintendent of the Sorg-Oglesby interests, and president of the new concern. Plans were drawn by Pretzinger and Mussulman, Dayton, Ohio, architects.

The Frank Smith mill will be entirely electric driven, with full automatic control of both the Fourdrinier machine and the beaters provided. It is said that the paper machine will be capable of a speed varying the spread from 80 feet per minute to 800 feet, according to the paper being manufactured.

The motors and electrical equipment are being installed under the personal direction of C. S. Newcomb, electrician of the mill. The motors manufactured by the Crocker-Wheeler Company of Ampere, New Jersey, are similar to a new type of motor being manufactured in Germany, and

You Pay for It—

No matter what fire brick you buy there are some things you must pay for anyway.

It takes as much to bake one brick as another of the same size. You pay as much in freight.

The duty and taxes are similar. You pay these costs in any case—but—the difference in clays and baking process, selection and building are what make the difference in fire brick value.

Tell us the conditions, and we'll specify the brick.

ELK FIRE BRICK CO.

St. Marys, Pa. Philadelphia, Pa.
Buffalo, N. Y. Boston, Mass.

In Canada:
ELK FIRE BRICK CO., OF CANADA, LIMITED
Hamilton, Ontario

Call Up—
"Headquarters in New England"
FOR
IRON STEEL
and Kindred Material

YOUR telephone inquiries will be intelligently handled and your needs given immediate personal attention. Complete stock of iron and steel products, every facility for immediate filling of orders and a fast fleet of motor trucks enable BROWN-WALES to give you service that saves time, money and inconvenience.

ARMCO
BROWN IRON STEEL WALES

Brown-Wales Co.
Bars—Sheets—Structurals

Lewiston 3169 — 120 Middle St. — Lewiston, Me.
Liberty 1687 — 6 Church Street — New Haven, Conn.
Congress 6100 — Boston, Mass.
Union 2685-6 — 249 Eddy Street — Providence, R. I.

ESTABLISHED 1828

The

Smith & Winchester Mfg. Co.

South Windham, Connecticut

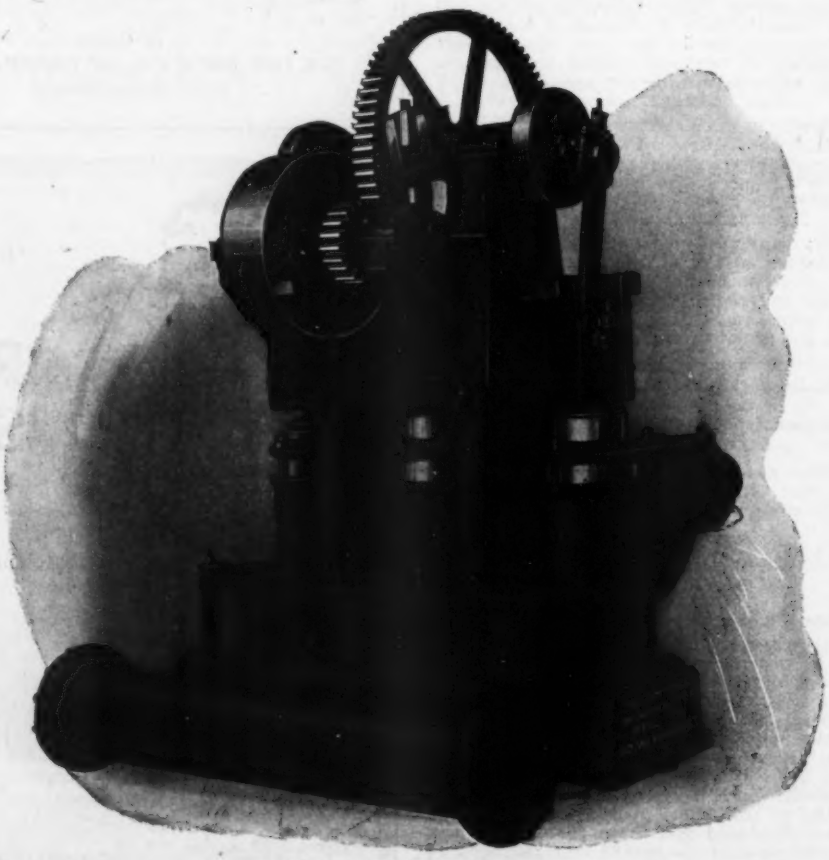
We Design and Build **PAPER MAKING MACHINERY**

Fourdrinier —— Cylinder —— Wet Machines —— Jordan Engines

—THE UNDERCUT TRIMMER—

PAPER BAG MAKING MACHINERY

Full Line of Tubing and Bottoming Machines



—Our Triplex Pump—

—RAINSTORM SHOWER PIPES—

are said to be of much heavier construction than the older style motors.

It is expected that the building will be entirely completed by April 1, and it is hoped that paper will be manufactured by June 1.

The Superior Paper Company, of Franklin, Ohio, has filed a petition in the Warren County Common Pleas Court asking for an order of dissolution. The petition was filed under the authority of the dissolution laws of Ohio, and was heard by Judge Wright who appointed Howard Ivans, an attorney of Lebanon, Ohio, as referee. The final hearing was set for ninety days from the date of the appointment of the referee and all testimony that is to be brought before the court is to be presented by Mr. Ivans at that time. This action is said to have been taken to conserve the assets of the company.

Oglesby to Build Addition

The F. K. Vaughn Building Company, of Hamilton, Ohio, has been awarded the contract for the construction of an addition to cost $100,000 to the W. B. Oglesby Paper Company, of this city. The announcement was made by J. A. Aull, president of the company.

The new building will contain the only bleach making apparatus in the city. It also will contain new beaters and rotary machines.

Employees' Association Elects Officers

The Mutual Benefit Association of the Gardner Harvey Paper Company, which is an organization representative of all employees, held the annual election of officers Saturday, February 16. The election was combined with a dance and entertainment which fully brought out the spirit of the organization.

J. B. Weishaar was elected president; Cecil B. Rogers, vice-president; Charles Feldman and Clyde Mears, directors.

$80,000 Fire at Srere Bros.

The Srere Brothers and Company, rag cutting and dusting mill of Franklin, Ohio, burned to the ground on the morning of February 25. Thirty employees escaped without injury. Loss is estimated at $80,000.

The fire, which started in a dust bin, is believed to have been caused by spontaneous combustion. Once under way, the highly inflammable rag stock caused the fire to spread rapidly to all parts of the building.

W. W. Statts, paper mill engineer of the Westinghouse Electric Company, Cincinnati, addressed the February meeting of the Miami Valley Division of Paper Mill superintendents Saturday evening, February 23, at the Elks' club in Hamilton, Ohio. His discussion of "Industrial Motors and Controls as Applied to the Paper Industry" followed a dinner served at 6:30 to representative paper mill men of the valley.

Well Known Paper Man Marries

Miss Myrtle Garver and Frank A. Smith, well known paper manufacturer, of Middletown, were united in marriage Saturday evening, February 16.

Mr. Smith has been superintendent of the mills of the Paul A. Sorg and W. B. Oglesby paper companies of this city for a number of years and is president of the Frank A. Smith Paper Company.

Robert W. Renick has resigned his position as assistant treasurer of the Advance Bag Company, of Middletown, Ohio. He is planning to launch into some business for himself.

Michigan News

Kalamazoo, Mich., March 1, 1924.

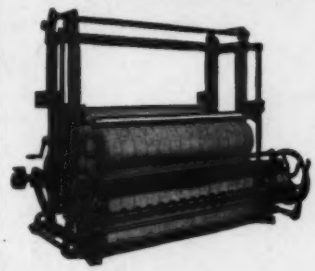
The Kelly Well Company of Kalamazoo, Michigan and Grand Island, Neb., has filed articles of incorporation with the secretary of state. The capital is placed at $100,000. The articles are signed by E. J. Long, vice-president. This concern is now operating in Kalamazoo and occupies the building in Fulford street, purchased from the Gregg Pump Company. This company plans on making pumps to bring water to the surface, for use in wells, which a great number of the paper companies in this locality have.

Huge Demand for Print Paper Keeps Price Steady

H. B. Harbison of Chicago, representative of the International Paper Company, principal speaker at the Michigan League of Home Dailies convention held in Grand Rapids

MEISEL

SLITTERS & REWINDERS



"Shearcut"

for all classes of Roll Products for

PAPER MILL

PAPER DEALER

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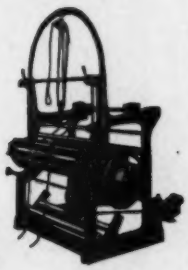

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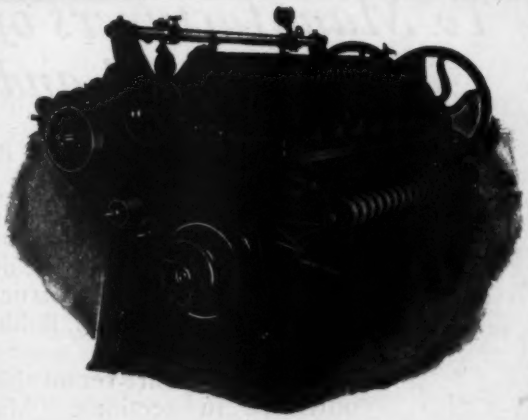

PAPER CUTTERS

Single, Duplex, and Diagonal

CUTTER KNIVES

PATENT TOP SLITTERS

Hamblet Machine Co.

LAWRENCE, MASS.

To Manufacturers of Binders Board, Leather Board and Fibre Board:

The New Coe Automatic Roller Dryer has many improvements which make it very suitable for this work, and will improve the quality, reduce waste, drying time and your costs.

Boards are dried continuously in one trip thru the dryer, usually in less than one hour's time depending on the thickness.

Frame and Roller Construction practically eliminate plugging or choking, even with thin, flabby boards, and it is very accessible for repairs.

Heating Coils are removable from sides of dryer and temperature controlled in sections. Machine is completely enclosed and insulated.

Our new air circulating and steam system produces a very uniform product, and in many cases the surface is sufficiently smooth so no calendering is necessary.

If you are not familiar with our machine for handling these products, write us for detailed information and we will also be glad to dry actual samples for you on our dryer. Proposals submitted under guarantee—capacities 5 to 50 tons daily.

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New York City

about the middle of February, told the delegates that they should little expect the price of print paper and other print materials to be reduced, because of the law of supply and demand.

"The exceptionally large demand for print paper and print materials has increased the value of them and consequently the prices are holding steady," declared Mr. Harbison. "Because of the lack of facilities in the country at present, it is manifestly impossible to meet the unusually large demand which is now existant. As a result, the prices have remained steady for some time, and at the present no indicator pointing to a reduction is in sight. Judging from conditions throughout the paper manufacturing industry—those conditions being governed by the law of supply and demand—prices of print stock are not likely to come down in the near future," concluded Mr. Harbison.

Paper Counsel Protests Condition of Railway Cars

At the fifth annual meeting of the Great Lakes Shippers' Regional Advisory Board, held in Grand Rapids, February 18, Ralph Tuttle, representing the paper interests of that city, entered a vigorous protest against the conditions of railroad cars offered for paper shipment, asserting that spikes and braces were the frequent causes of damage.

Speaking pointedly to the railroad representatives present at the meeting, Mr. Tuttle declared with heavy emphasis: "If it is possible for you to exercise precaution in assigning us cars, in the name of heaven do so, for the Lord only knows we have enough trouble without constantly being wound up in a ball of red tape about damages due to poor car conditions.

"It's true, of course, that we usually get satisfactory settlements on damage claims, but that's not the point—at all. Damages due to hazardous conditions of cars, slow up your business and ours; our time is wasted and no end of trouble results.

"If you could only hammer into the heads of your inspectors the importance of seeing to it that they assign us cars free from spikes, braces and loose boards, both our business and yours will be expedited, and we all would be relieved of a great deal of grief. Just try it once and see!"

Monthly Meeting of Superintendents

On February 21, the Michigan Division of the Superintendents Association held their regular monthly meeting. Mr. Edgar Rhodes gave an interesting illustrated lecture on "Tannate Belting," wherein he cited instances where one Tannate outlasted four other leather belts.

Mr. Sherwood of the B. F. Goodrich Rubber company, gave an interesting lecture on "Cutless Bearings and their Uses in a Paper Mill." He made some very broad statements on what his bearings will do, and he talked so well that Mr. Gilman, superintendent of the Bryant Paper Co., has ordered several of them to try out on the wet end of his machines.

Among those present were: L. F. Montgreig, U. S. Rubber Co.; E. H. Gilman, Bryant Paper Co.; James Wright, Wm. Cable Wires, Kalamazoo; Mr. Reed, Mr. Sherwood, B. F. Goodrich Rubber Co., Charles G. Bard, Wholesale Mill Supplies, Kalamazoo; Wm. Sieviert, Michigan Carton Co.; L. H. Chenoweth, B. F. Goodrich Rubber Co.; Harry Urich, MacSimBar Paper Co.; Geo. Pountain, Monarch Allied Mills; Otto Fisher, Bryant Paper Co.; Frank Libby, Kalamazoo Veg. Parchment Co.; Ed Couglin, Allied Mills; Michael Redmond, Kalamazoo Paper Co.; Elbert Milham, Bryant Paper Co.; Clarence Harter, Rex Paper Co.; Jacob Parent, Western Board & Paper Co.; Emil Yonke, Standard Paper Co.; Mr. Foxgrover, Western Paper Makers Chemical Co.; Jake Kuss, Allied Mills; Frank Johnson and Herb DeYoung, Allied Mills.

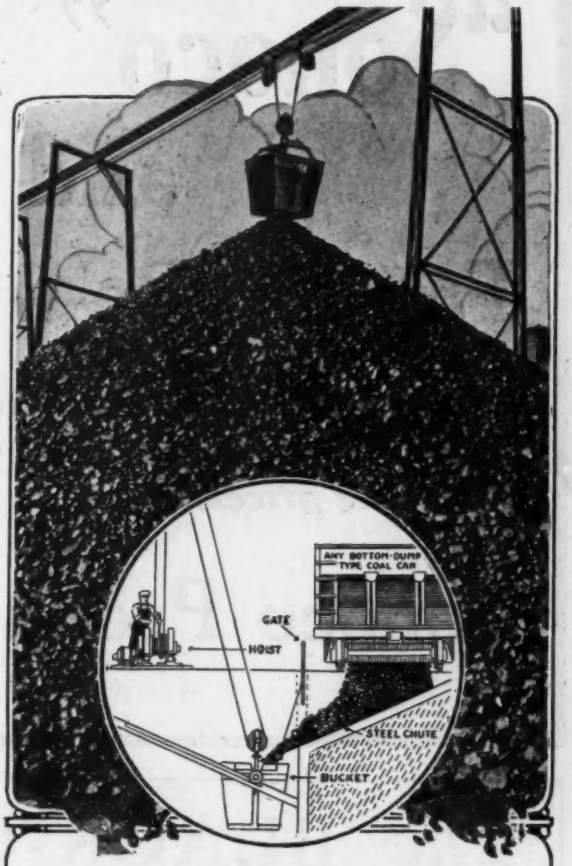
W. B. Milham, vice-president of the Bryant Paper Co., has returned from St. Petersburg, Florida.

To Build New $500,000 Mill

The Star Paper Company of Kalamazoo has changed hands. Bert Cooper, formerly Assistant Manager of the Dunn Sulphite Paper Co. of Port Huron, Michigan and Frank Niesink, have purchased the business. The Star deals in paper and paper products, notions, and wooden ware.

Mr. Cooper was for years purchasing agent of the Kalamazoo Paper Co., leaving there to act in the same capacity for the Kalamazoo Stationery Co. A few months ago he left the Kalamazoo Stationery Co. to accept the position of assistant manager of the newly organized Dunn Sulphite Paper Co. of Port Huron.* This concern is having its plans drawn by Billingham & Cobb, architects of Kalamazoo, Michigan. They are erecting a mill that will cost approximately $500,-

Coal Without Limit



A Paper Ingredient

Isn't it true that coal enters into the manufacture of paper in the same degree that other material costs enter into it? Whether it appears on the books as an operating expense or a stock inventory, it constitutes a most important factor in the financial statement of the business.

This being the case, a GODFREY CONVEYOR proves a wonderful investment and one that pays very substantial dividends. The GODFREY CONVEYOR will transfer fifty tons of coal from a hopper-bottom car to your boiler room, or to outside storage, in an hour and a half, at a power and labor cost of from three to seven cents a ton, depending entirely upon the distance carried. One man handles the whole operation.

Figure it out for yourself, based on your approximate annual tonnage, as compared with what this same work is costing you now. Add any demurrage you may have paid out during the past year. Consider any difficulty you may have experienced in securing the necessary labor to unload your coal—and then see if you don't think this proposition is worth looking into.

Ask for Bulletin A-1

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The BLACK-CLAWSON CO.

Leading Builders of Paper and Pulp Mill Machinery

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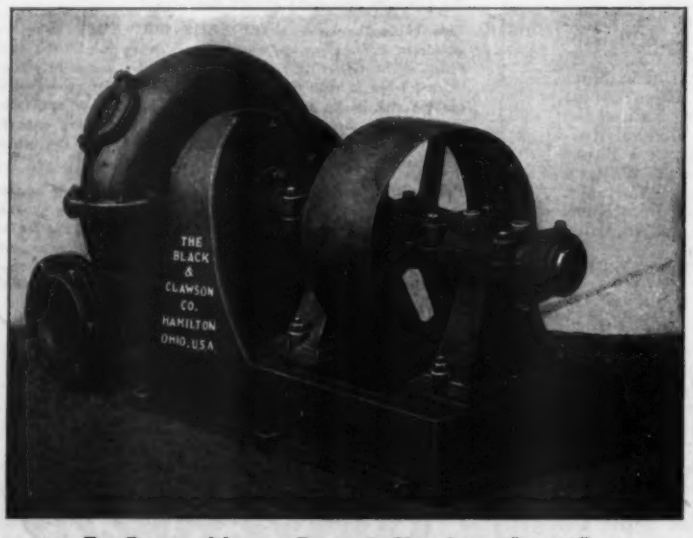


Fan Pumps of Iron or Bronze in Sizes from 2" to 12".

ESTABLISHED 1873, and since we have steadily grown and stood forth as leaders in the manufacture of paper making machines and other equipment for every requirement in Board, Pulp and Paper Mills.

Our large plant and special equipment with skilled and trained help enable us to render efficient and prompt service and satisfaction to a customer.

The best is none too good. Let us serve you.

000. It will be a one machine mill, and make crepe paper. It is understood that they have a large contract with Dennison for this paper.

Fight for Better Freight Rates

Efforts to obtain what is considered an equitable freight rate on bituminous coal from the Ohio and Outer and Inner Crescent fields (West Virginia and Kentucky) is shown by the filing of a complaint with the Interstate Commerce Commission by Charles H. Winslow, traffic manager of the Chamber of Commerce and James F. Dougherty, traffic manager of the Michigan Paper Mills Traffic Association.

This is the resumption of the fight started years ago to obtain relief for paper mills in Kalamazoo valley district and other kindred industries. Discrimination is alleged and to this end comparisons are made with the rate from Toledo to Detroit and from Toledo to Kalamzoo. Inference is drawn that the local concerns are paying 2.42 mills per ton per mile for each of the 93 miles to Kalamazoo over Detroit and more than Detroit pays over Toledo.

The charge is made: "That complainant's members have suffered damages by reason of the collection from them of charges herein alleged to be unlawful on all shipments of bituminous coal from the Ohio fields and the Inner and Outer Crescent fields."

Request is made for a hearing in Grand Rapids. Mr. Winslow declares it means a long fight at the best.

Petoskey Paper Mill Sold to Junking Firm

The Petoskey Paper Mill, owned and operated by the Northern Michigan Pulp Company, was sold February 4, by the Grand Rapids Trust Company, in United States district court in Grand Rapids to the junking firm of Brown & Graff of that city and Kalamazoo.

Complete assets, including buildings, machinery, real estate, leases on water power site, other leased property and a quantity of pulp wood, were disposed of for $13,100 which represents only a small portion of the original cost.

Part of the plant was destroyed by fire last spring, and the company later went into bankruptcy in June, since which time—until the sale—it has been in the hands of the Grand Rapids Trust Company for liquidation.

The Petoskey Ice Company has been made custodian of the plant by the purchasers, and authority has been given to sell any supplies, fixtures or machinery, much of which is in good condition, it is said.

Standard Paper Acquires New Mill Site

The Standard Paper Co., located in North Pitcher street, has acquired a new mill site, according to the announcement just made by B. C. Dickinson, president of the company. Other than the statement that the concern is contemplating extensions of importance, Mr. Dickinson said he can make no further or more explicit announcement of future plans at this time.

The property acquired was purchased from the Chicago, Kalamazoo and Saginaw Railroad. It consists of over five acres of land, located between the railroad right of way and Kalamazoo River, practically directly east of the present plant of the Standard Paper Co.

Deeds have been filed and the transfer paper being signed by A. H. Smith, president of the New York Central Lines.

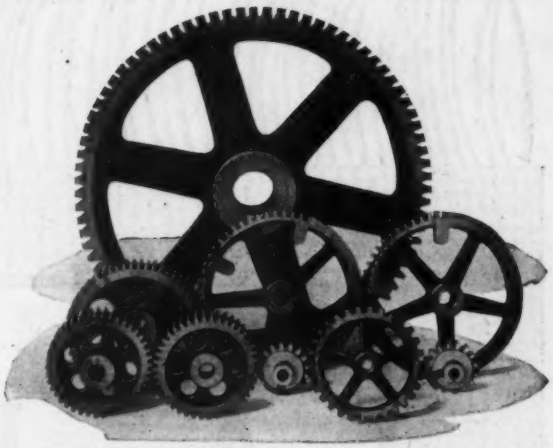
$1,000,000 Division in Stock Is Sought

Suit involving the disposition and division of more than $1,000,000 worth of stock in the Eddy Paper Corporation of Illinois, operating plants at Three Rivers and White Pigeon, Mich., was opened before Judge Clayton Johnson in St. Joseph, (Mich.) circuit court at Centerville, February 25.

The suit was instituted by John C. Maxwell and other minority stockholders to offset a deal voted at an adjournment meeting of stockholders in 1922, whereby the Eddy Paper Company, a Michigan corporation, agreed to dispose of its entire assets to the Eddy Paper Corporation of Illinois.

Mr. Ed MacEllroy, of the V. D. Simon Engineering Co., is working on the new power plant at the Bryant Paper Co., getting it ready to turn it over to the Bryant Paper Co. At present, the plant is operating the Bryant Division and the Imperial Division, with a great saving of coal over the other method of separate power units. The trestle work is up for the Superior Division, but as yet, the Superior is operating two boilers for fire protection only. The work is being rushed, and hopes are held out for an early completion of the project.

State compensation laws and labor laws in general were the subjects presented at the recent session of the Foremen's



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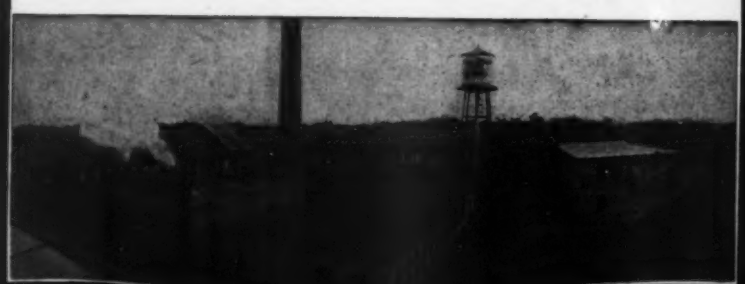

Club of the Bryant Paper Company. John Ross, paymaster of the company gave the talk, devoting most of his attention to the compensation features. This was followed by a general discussion of points brought out. Following this adjournment was taken to the auditorium in the administration building, where employees of the company were having a card party.

Will of the Late George E. Bardeen Filed

The will of the late George E. Bardeen, paper mill magnate of Otsego, Mich., has been filed for probate in Kalamazoo, Allegan County, Mich. It disposes of his entire estate estimated to aggregate more than $1,000,000 to members of his immediate family.

The will names his widow, Mrs. Florence G. Bardeen, as executrix, and specifically directs that she be unhampered in the execution of it in whatever manner she sees fit.

The Parchment Father and Son banquet was held Friday evening, Feb. 22, and brought out a crowd of nearly 200. There were talks by Marvin J. Schaberg, city attorney; Charles Kindleberger; Henry Daub; Homer DeYoung and Alfred Southon. Jacob Kindleberger, president of the Kalamazoo Vegetable Parchment Company, acted as master of ceremonies. During the diner hour, community singing was enjoyed.

At the annual meeting of the stockholders of the Star Brass Works, S. B. Monroe, treasurer of the Allied Paper Mills, and Hawthorne Paper Co., was named a director of the concern to fill the vacancy caused by the death of Charles A. Peck. A. B. Connable, a director of the Kalamazoo Paper Co., was named president.

At its recent board of directors' meeting, the Michigan Paper Company of Plainwell, Mich., elected George M. Ames of the Owen, Ames, Kimball Company, building contractors of Grand Rapids, to the office of president for 1924.

Wisconsin News

Port Edwards, Wis., March 1, 1924.

The Summers Patent

Mr. B. S. Summers of Port Huron, Michigan, has perfected a method of chemical control in connection with the manufacture of sulphite chemical pulp, for which letters patent have been issued by the United States Government, according to the late Patent Gazette.

This is not the first time Mr. Summers has been to the front in connection with patents for fibre making industries. He also invented the process for making fibre rugs in use in so many States today

This new chemical control of sulphite pulp, quick cooking was perfected and is in use in the Port Edwards and Nekoosa Mills of the Nekoosa-Edwards Paper Company in Wisconsin and by this control a very much whiter and stronger fibre is produced, making the quick cook pulp more closely resemble the slow cooked or Mitscherlich pulp which has also lately been greatly improved by Mr. Summers at three of the Mitscherlich mills in Michigan, at Port Huron, Detroit and Alpena.

Mr. Summers is a graduate of Ann Arbor and has been a manufacturing chemical consulting engineer for many years among the fibre producing industries.

New Process May Abolish Kraft Odor

The possibility of introducing a new process which will eliminate the disagreeable odor which accompanies the manufacture of Kraft pulp by the sulphate process is being considered by the officers of the Nekoosa-Edwards Paper Company of Port Edwards, Wisconsin.

Experiments with the new process are to be made on a small scale at the Nekoosa mill, and if they are successful it is understood that the process will be introduced in the Nekoosa mill.

Mr. B. S. Summers of Port Huron, Michigan, the inventor of the process, was in conference with the Nekoosa-Edwards officials in regards to the proposed experiments with the process, upon which he has already applied for patents. The process has proved successful in laboratory tests, and it is expected that the experiments to be made at Nekoosa will show conclusively whether or not it is practical for large scale operations. If the process proves to be successful it is expected to have a revolutionary effect upon the Kraft industry.

Miscellaneous contracts for the completion of a new 2-story mill, 80x100 feet, estimated to cost $400,000, with equipment, are being awarded by the Dells Paper and Pulp Company, of

A PULLEY
FOR EVERY PURPOSE

This will give you an idea of the wide range of sizes and styles of Cast Iron Pulleys that is constantly flowing through our shops.

Every one has been designed and will be used for some specific service—so you see they represent more than just "Pulleys."

Every article that goes to make up

The T. B. WOOD SONS CO. Line

of Power Transmission Machinery receives the same careful Engineering attention and can be furnished in the same wide variety of sizes and styles as the pulleys shown above.

Let us have an opportunity of figuring on your "Pulley Problems."

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POWER TRANSMITTING MACHINERY

Rhoads Watershed Tannate

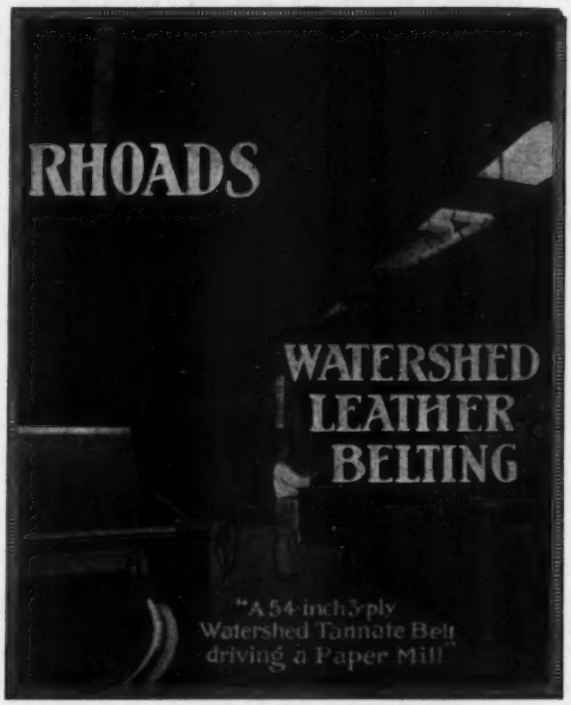
Has Wonderful Tractive Grip

THERE are still some who think leather will not stand up in wet places. But we have been installing Watershed Tannate in such for years and it gives great satisfaction.

If you have a particularly troublesome drive, wet or dry, try Watershed Tannate under our service guarantee.

This reads, "If a Rhoads Belt does not show you a lower cost per year than other belts, when you consider length of life, reduction of repairs and take-ups and increased output, send it back to us, and we will refund you whatever part of the purchase price you claim is right."

Give Us a Chance at It; the Risk Is Ours



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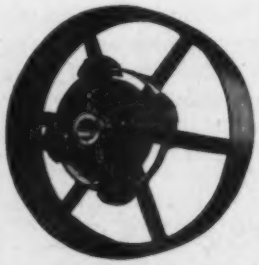

FALLS SOLID FRICTION CLUTCH PULLEY

THE FALLS CLUTCH & MACHINERY COMPANY

NEW YORK 286-288 Fulton Street Cuyahoga Falls, Ohio BOSTON 52 Purchase Street

Catalogues upon request

Eau Claire, Wis. It is expected to have the unit ready for the machinery installation at an early date. The project includes a power dam for plant service. L. A. De Guere, Wood Bldg., Wisconsin Rapids, Wis., is architect and engineer.

Nepco Operations

The new bleach plant at Port Edwards Mill of Nekoosa-Edwards Paper Company has started and is making a fine grade of bleached sulphite pulp. Equipment for the use of liquid chlorine has been installed and the company now produces its bleach liquor at the minimum of cost. The Bellmer Bleachers, the Rogers wet machine and all other equipment is of the latest design and the arrangement is of the best approved type for production and economy. The new Yankee machine at Port Edwards is now producing bleached M. G. papers in 20 lb., 23 lb., 25 lb. and 30 lb., and with the already large line of M. G. papers in sulphite Kraft with the present large demand, things are very busy around Nepco mills, both in Nekoosa and Port Edwards. January shipments were the largest ever heard of in the business of the Nekoosa-Edwards Paper Company and orders for February look like it will be a repetition thereof. It keeps some shipping crew to handle 200 tons per day of counter rolls, averaging around 35 lb. to the roll, some 12,000 rolls per day being made and shipped from these mills.

The machine at Port Edwards, known as No. 6, a 116" Beloit news print machine operating at speeds up to 650 ft. per minute, is to be equipped with new screens of the Bird type universally used on new installations.

Delivery will be made early in April and it is hoped that the transfer from the large number of flat screens to the two new screens of the revolving type, can be made without any loss of time.

At the last meeting of the Board of Directors of Nepco, it was learned today, a new pulp unit was authorized for the Port Edwards mill. Orders have already been placed for the necessary machinery, grinders, pulp refiners and it is hoped that the new machinery will be in operation by April 1st at the latest. E. P. Gleason, engineer in charge and John Walley, supt. of construction, have the work in hand and everything arranged for. This new unit will not greatly increase the product; but will cause greater economies and will greatly reduce the cost at certain times of the year. Some machinery will be moved up from Nekoosa mill and be added to the Port Edwards equipment and before the year 1924 is over, it is hoped that the manufacture of groundwood will be entirely removed from the Nekoosa mill.

Mr. B. T. McBain, assistant general manager of the Nekoosa-Edwards Paper Company, Port Edwards, Wisconsin, has just returned from a three weeks' visit to the Pacific Coast. While on the Coast Mr. McBain visited many of the mills out there.

Some of the mills visited by Mr. McBain were the new Washington Pulp & Paper Co. at Port Angles, Washington, the Hawley Pulp & Paper Mills in Oregon, and the Crown Willamette Mills in different coast cities.

While on his trip Mr. McBain visited many of his friends as the West was his former home before he became affiliated with the Nekoosa-Edwards Paper Company, as during his 27 years with Pacific Coast Mills he made a host of friends.

Mr McBain also visited his father and mother who reside in sunny California.

Continued Low Water in Wisconsin Causes Curtailment in Production

The low stage of water in the Wisconsin River which has existed throughout the entire fall and winter thus far, is the cause of the Consolidated Water Power & Paper Company of Wisconsin Rapids, Wisconsin, shutting down of their Wisconsin Rapids and Biron, Wisconsin, plants for one or two days per week.

The stage of water in the Wisconsin River during the past fall and present winter is one of the lowest in the history, and as a result the Consolidated Company were unable to grind the usual quantities of groundwood to store for winter use as has been always done in the past. Considerable tonnage is made during the periods of the fall when the water is high and this with what can be made during the winter generally takes care of all requirements.

Although a large amount of groundwood has been received from the above company's Canadian plant, this with the amount they have had on hand has been insufficient to keep the Wisconsin Rapids and Biron Mills in full operation. The first shut down was at the Rapids mill on February 16th. It is not expected that this shortage will continue for any longer than a period of thirty days after which a full

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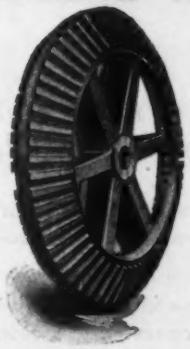
Whether it is an ordinary spur gear or a bevel mortise design such as the one shown, we have special machinery and unusual facilities for the rapid production of all kinds of gears. We make Spur, Bevel, Mitre, Angle, Helical, Mortise, Internal, Worms, and Worm Gears. Our Gear Service with 16,000 different sizes at your disposal. Your inquiries and orders will receive attention unequalled.
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Only two of many from all grades of waste paper which are blown and sterilized

at 600 degrees of heat, and can be water, grease, and moisture proofed for edible products and processed in different ways for various purposes.

Moulds are interchangeable in the machine, and any number of units may be operated in a row.

Exclusive Licenses under the process patents are being granted for States and Groups of States and Foreign Countries. **Factory Rights** are issued on a royalty basis.

Thirty-one States and several Foreign Countries are now under license. Machines installed in 7 Cities, others contracted for.

Seamless Boxes, Cans, and Shapes of all kinds blown from pulp of all grades by the

Drake Process

with automatic machines in a single operation

Replacing the million dollar board mill and expensive box making plant

THE DRAKE PROCESS, Inc.

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schedule may again be adopted in place of the four and five day now in effect.

This is a new thing for the Consolidated Company's mills for these have a record for continuous operation and at full capacity which is a record that most mills cannot equal.

Steam turbines which were installed during the year 1923, have enabled the Nekoosa-Edwards Paper Company's mills at Port Edwards and Nekoosa, Wisconsin, to run to full capacity. These have made these mills more or less independent as regards the stage of water in the river. One new steam turbine was installed in the Nekoosa mill and one at the Port Edwards mill, making a total of three.

This auxiliary steam power together with the efficient water wheel grinders that have also been installed, gives Nepco a good combination of pulp making equipment for low water times.

No trouble whatsoever is expected from the present stage of water.

Survey of Wisconsin River to Determine Pollution and Effects of Pulp and Paper Mill Waste Now Under Way

Much has been said pro and con about the pollution of streams by pulp and paper mills and the effect of this pollution upon fish and other life.

There is being conducted at present in Wisconsin by the State Sanitary Engineer's Department a survey of the Wisconsin River to look into this matter and to find out the extent to which this river is being polluted by paper and pulp mills in the Wisconsin River Valley. Mr. C. M. Baker, state sanitary engineer of Wisconsin, in a report recently made public announced that the result of the investigation will be made public and published before the end of the present year. This will be the most complete survey ever attempted in Wisconsin and will continue throughout the year 1924.

This work was started in the fall of 1923 when samples of river water were collected from along the different points in Wisconsin which have mills at some of the places at which these samples were taken, being in the vicinity of Wisconsin Rapids, Stevens Point, Mosinee, Wausau, Merrill, Tomahawk and Rhinelander. These samples are now being analyzed.

During the coming summer more samples will be taken from the same points and comparisons made with the high water samples taken during the fall and the low water samples during the summer.

Investigations will also be made to determine the character and volume of the various pulp and paper mill wastes at each of the mills.

When this work is finished a report will be printed which will give the effect of this waste upon this stream, and this should settle for all time the controversy which has always existed as regards the extent and effect of the different mill wastes upon the waters of the Wisconsin as well as other rivers.

New Beater Roll

One of the newest designs of beater roll has been perfected by Mr. C. E. Youngchild, general paper mill superintendent of the Nekoosa mill of the Nekoosa-Edwards Paper Co.

This roll is so designed that the capacity of the beater is increased considerably from 25 to 35 per cent and this is done by hydrating the fibres much faster than by the old method of beating. These rolls have been installed in all of the beaters in the Nekoosa mill of the Nekoosa-Edwards Paper Company and some have been installed in the Port Edwards mill. The experimental stage is over as these have been tried out for a considerable time.

The new rolls save time, power, labor and equipment and produce a much better grade of paper for wrapping purposes. The sheet has a much better folding and tear test and this is done without reducing the pop test as shown by the Mullen tester.

These will be put on the market as soon as the patent papers are issued. There have been numerous inquiries from manufacturers of paper who have heard of this roll but nothing can be done until the above papers are issued. It is expected that these will be put on the market by some well known manufacturer of pulp and paper mill machinery.

New Metal Plugs for Counter Rolls

Another invention which was originated by two of the Nekoosa-Edwards Paper Company employees, Mr. Gilbert Marvin and Joseph Wiphli is a new metal plug for counter rolls.

This plug will take the place of the present heavy wooden plug which is in use throughout the entire industry today in the wrapping paper mills.

This plug weighs less than 25 per cent of what the wooden

Starch

Paper manufacturers generally recognize the value of starch in the manufacture and coating of paper.

To obtain definite results in any desired direction in the preparation of paper, not merely a difference of grade, but a difference of kind or variety of starch is required.

Our carefully controlled and thoroughly standardized processes enable us to produce exactly the various starches which the paper industry has found economical and efficient.

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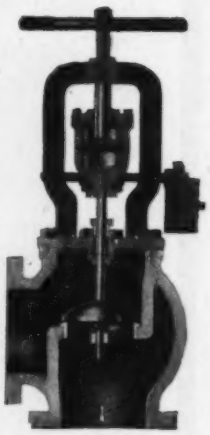
The internal dash-pot, exposed to scale formation, is frequently the cause of failure to operate in many valves. This Davis Valve cannot stick; it has an outside oil-filled dash-pot, which cushions the slightest movement of the disc.

The engineer is never in the dark as to the internal condition of this Davis Valve; it has an indicator which tells at all times just how it is working. It can be tested by hand. Write the Davis Valve Company, 414 Milwaukee Ave., Chicago, for your copy of their Valve Catalog—it will prove worth while.



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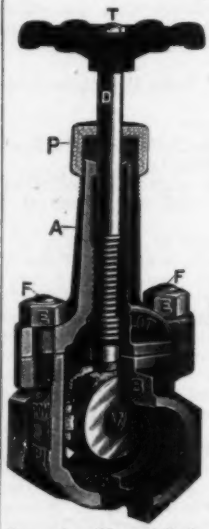

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Foster Non-Return Stop Valve
(AUTOMATIC)

Affords needed protection, where several steam boilers, under different pressures, discharge into one leader or steam pipe. It automatically shuts off connection between a boiler in which for any reason pressure falls and others at higher pressure, rendering back flow of steam into the low pressure unit impossible.

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plugs do and when these are put on the market will save many dollars to the paper mill as well as the final consumer of wrapping paper.

It is estimated that with the 6,000 tons of paper that are at present being manufactured in the United States today that 100 tons of plugs are used per day. 25 per cent of this amount will make 25 tons and the wood used for plugs could be used to make into paper.

Well Known Paper Pioneer Marries

George A. Whiting, 74 years old, one of the pioneer paper manufacturers of Wisconsin, who was married in Chicago on Monday, is speeding to the sunny southland on his honeymoon. The bride was Mrs. Mae R. Babcock, who gave her age as 49 years. It was the paper manufacturer's third marriage. He retired from active participation in the enterprises in which he is financially interested five years ago.

Mr. Whiting's interests cover many sections of Wisconsin and the upper peninsula of Michigan. He came to Neenah in 1865 and founded the Whiting Paper company with branches in Menasha and other cities. He also controls the Wisconsin Paper and Pulp Company at Whiting, Wis., the Proper Paper Company of Neenah and the Whiting hotel at Stevens Point.

Give a Name to Dam Now Under Construction

The Directors of the Wisconsin Valley Electric Company at their annual meeting in Wausau, voted to name the new dam which this company is constructing near Merrill, "The Walter Alexander Dam" in honor of Walter Alexander, a stockholder in the company since its beginning and who is also vice-president of the Marathon Paper Mills Co.

Officers of the Wisconsin Valley Electric Company which is a public service corporation and which supplies light and power to many of the paper mill cities in the Wisconsin River Valley including Wausau, Tomahawk, Stevens Point, Merrill and others are C. C. Yawkey, president; B. F. Wilson, vice-president; C. S. Gilbert, Sr., treasurer; Harold L. Geise, secretary and manager. The directors are the officers and J. S. Alexander, G. D. Jones and A. L. Kreutzer.

Consolidated Co.'s New Plant Operating

The new Jones beaters and other equipment changing over part of the news mill of Consolidated Water Power & Paper Co., Wisconsin Rapids, to manufacture 20 lb. bleached papers for bread wraps, is in operation and one of the 132" Beloit machines is now turning out this new grade for these mills, of a good quality at a very satisfactory rate of speed.

Lyman Beeman, for so many years an expert of the Kimberly-Clark Company, has been associated with the Consolidated Company for the past six months and is aiding in keeping this new grade up to the standard required.

The Consolidated mills get their bleached pulp from their own slow cook sulphite mill at Appleton, known as Interlake Pulp & Paper Co.

Blizzard in Wisconsin Affects Operations of Mills

An exceedingly severe snowstorm and blizzard which swept over the State of Wisconsin during the middle of February was one of the worst which has been experienced for a number of years. This seriously affected the operation of some of the mills and paralyzed railroads running through many paper mill towns. At some places workmen could not get to the mills for one and two days and as a result production was curtailed.

Operations at the Peshtigo Paper Company mill at Peshtigo were probably affected the most as it was necessary to shut down one paper machine. Trouble was also experienced at Kimberly and Combined Locks.

Interlake Men on Tour to Europe

Mr. Henry A. Babcock and Mr. Vance P. Edwardes of the Interlake Pulp & Paper Company of Appleton, Wisconsin, sailed from New York on February 16th for Europe.

While in Europe these gentlemen will visit England, Norway, Sweden, Finland, Germany and France, where they will make a study of paper and pulp manufacturing conditions in these several countries. They expect the trip to last about two months.

Rumor has it that William Randolph Hearst, owner of a string of daily newspapers, will build a large newsprint mill at Murphysboro, Ill. It is said that plans call for the purchase of several thousand acres of Mississippi valley land which will be planted with cottonwood, to be converted into wood pulp, then into newsprint.

PRATT & CADY VALVES

Fig. 100 Bronze Renewable Ring Gate Valve

IT IS easy to renew the wearing parts of Pratt & Cady retaining ring gate valves without removing the valve from the line. Once installed it stays there! Large and comprehensive stocks at all times assure you prompt service.

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Made for maximum service not merely the average

TRADE JENKINS MARK

Jenkins Bros

Fig. 334, screwed, Standard Iron Body Quick-Opening Gate Valve with sliding stem and lever.

Quick-Opening Gate Valves

Jenkins Gate Valves with sliding stems are quickly opened or closed by a pull of the lever attached to the stem. The small lever is used to hold the gate at any position it is desired.

These are handy, time-saving valves on pulp lines, drain lines, and wherever a quick full flow is desired and where the valve must be worked very often.

Valves in bronze, iron, and steel for all requirements of the paper industry. At supply houses everywhere.

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We offer slightly used equipment from the Old Hickory Powder plant at attractive prices.

MAMMOTH JR., JORDAN ENGINES. Maker, Noble & Wood Co. Shell 5 ft. 6 in. long, with 10-in. inlet and 6-in. outlet. Capacity, 30 tons per 24 hours. Will run either direction at 350-375 r. p. m. Fitted with steel bar knives, block and oak fillers.

WELDED STEEL DIGESTERS. Maker, Continental Iron Works. Capacity, 1,300 cu. ft. Inside diameter, 8 ft. Length, overall, 27 ft. Working pressure, 110 lbs. per sq. in. Tested, 165 lbs. per sq. in. Each digester complete with cast iron supporting ring, hoppers, guides, and all accessories.

823 H. P. STIRLING BOILERS. Type M-30, 200-lbs. pressure, with Westinghouse 8-retort stokers, Buffalo stoker engines, Vulcan soot cleaners, 100,000 cu. ft. capacity forced draft fans, Bailey flow meters, and all accessories.

BOILER FEED PUMPS. Alberger-Curtis make. 8", 3-stage, 1,050 g. p. m. capacity, direct connected to 181 h. p. Alberger-Curtis Steam Turbines, 150 lbs. working pressure.

BUFFALO FORCED DRAFT FANS. Type T-D 9½, 100,000 cu. ft. capacity, direct connected to 225-h. p. Moore Steam Turbines.

350 H. P. CORLISS ENGINES. Allis-Chalmers, 18"x36". Heavy duty mill type. Double eccentric. Crown face fly wheel 11 ft. diameter by 32-in. face. Complete with Richardson-Phenix oil filtration and lubricating system.

Feed Water Heaters
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THEY GIVE LONGER SERVICE PER UNIT OF COST

The bridged steel link insures strength and permanency. The large case-hardened pins and bushings, both reversible and renewable, insure durability and economy.

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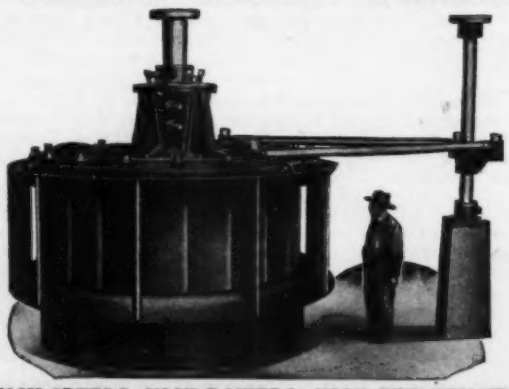
TURBINE WATER WHEELS



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Pacific Coast News

San Francisco, Calif., March 1, 1924.

Blake, Moffit and Towne have recently taken over the building, stock and interests of the Bay City Paper Company, formerly conducted by Joseph Straus and Simon Danz at 209 Clay Street, San Francisco. The business will be continued as a branch warehouse until the completion of the lease. Under the former ownership, Joseph T. Smith was manager. This same concern has also recently opened a branch at Santa Rosa, where they have secured the coarse paper interests of the Pioneer Paper Company of Los Angeles.

The Western Waxed Paper Company are now occupying their new plant built at Emeryville, covering 30,000 square feet of floor space. This company is a subsidiary to the Central Waxed Paper Company of Chicago and has for several years supplied the Western trade through a plant operating at Portland, but now that the new industry has started here much of the western business will be transferred to this part of the organization. Nearly $400,000 was invested in the new enterprise here. R. A. McDonald is the president of the company operating this plant and R. E. Donnelley is president of the Central Company with headquarters in Chicago.

W. F. Haley has come to Oakland, Cal., from Portland, Ore., and has purchased 70,000 square feet of ground in Emeryville, where he will erect a plant to manufacture blackboards from pulp. From a plant at Portland operated by him a business of over $300,000 was produced last year. One order alone exceeded 160,000 blackboards shipped to Japan and within the last three months some three carloads have been shipped to schools in California. California and Oregon spruce are used in the pulp which is produced in the Antioch Mills. The payroll will exceed an average of $10,000 monthly.

Paraffine Companies Take Over New Plant

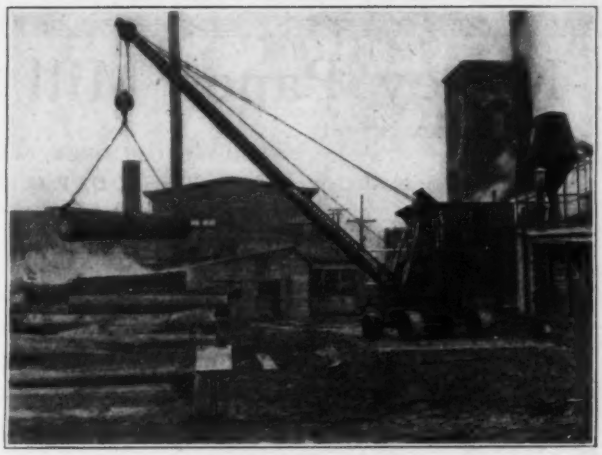
The Paraffine Companies, Inc., operating from San Francisco as headquarters, have taken over the Durable Roofing Plant at Portland. The Paraffine company operates extensive wall board and sulphite plants at Port Angeles and a board mill and fibre plant at Sumner in Washington. With the acquisition of this new plant, the total plants operated by the Paraffine interests number seventeen in all with an annual business of over $15,000,000, employing over two thousand workers and with a capital of $12,000,000.

Mills of the Paraffine Companies, Inc., at Antioch, have had a series of fires, some three in number and each at a considerable loss in buildings, equipment and new stock. Labor troubles, from time to time at the plant, is said to have incurred the enmity of discharged workers, and these members are charged with having caused the many fires. Repairs have been made and improved facilities for combating any future fires have been made. Much waste stock is turned out in this plant in the form of card stock and much of the product is made into egg fillers.

The Paraffine Companies, Inc., have arranged a vacation schedule for the workers as follows: All workers of three years or longer, one week; four years or less than five, ten days, while those employees over five years will have two weeks. It is believed the plan will in the end largely lower the "turn over" of employees. Figures were obtained covering the subject and the matter analyzed at considerable length before the plan was adopted regarding vacations with pay was planned. It is a subject that will be watched with interest by other large employees of labor.

Olaf Kjellstrom is now in the Bay District as a visitor from Gothenberg, Sweden. He is an important character in the paper interest of that country and the managing director of Ekman and Company, which has an unbroken history of more than a century. Originally this company was engaged in the exclusive iron industry, but of late years have widened the scope of their activities and are now manufacturers of paper. He stated that paper was now being sold at "rock bottom prices."

Some few months since a large delegation of Chamber of Commerce members went on an extended trip into the Alaska ports and those of the delegation interested in paper have sent word home that Californians are asked to become interested in the development of wood pulp emanating from the Alaska plants. It is the thought of those on the trip that if interest is shown it will eventually result in direct steam-



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Specially Built to Suit the Capacity of Your Mill

The cost of handling pulpwood and logs is surprisingly low when you use a crane that is designed especially for your mill.

To buy a machine simply because the manufacturer builds only a certain size is poor economy. Our cranes range in capacity from 5 tons to 50 tons and are designed for handling small pulpwood with a grapple or single logs weighing up to 10 tons.

They are mounted for traveling on railroad track or on the ground surface and may be equipped with either electric, gasoline or steam power.

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WIRE SIGNS

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ship lines connecting San Francisco with the prosperous cities of Alaska.

Travelers from China report that about 7,000 tons annually of old newspapers are sent from the Pacific ports to China dealers, where they serve as wrapping paper by many merchants. This old stock is shipped in iron hooped bails of 200, 280 and 560 pounds. Magazines are not used and the prices obtained vary with the costs here plus an added ten percent there averaging $95 gold per long ton.

The Itasca Paper Company, 4th and Minnesota Sts., St. Paul, Minn., has commissioned the Jacobson Engineering Company, 1645 Hennepin Ave., Minneapolis, Minn., engineer, to prepare plans for a proposed mill at Little Falls, Minn. Plans are made for the work on the initial buildings to commence at an early date.

The Puget Sound Pulp and Paper Company are planning to construct a new paper and pulp mill near Seattle, Wash. Equipment will be electrically operated and negotiations are under way with the city of Seattle for power supply. The estimated cost of the mill, consisting of several units, is $5,000,000.

Announcement was recently made by the officials of the Portland Pulp and Paper Company, of Portland, Ore., that construction work on a $1,250,000 plant to be located at North Portland, would begin April 1. The mill designed will have an output of 50 tons of Kraft per day.

Canadian News

March 1, 1924.

Increased Earnings in 1923

The position of two prominent Canadian paper companies, as shown by recently published annual statements, is very satisfactory, and shows appreciable improvement during the last year.

With net earnings for the year ended December 31, 1923, after depreciation, bond interest, and regular preferred dividends, at $995,111, or equal to $7.10 per share on the common stock, the showing of the Brompton Pulp & Paper Co. and associated companies is the best in the history of the organization, with the exception of the boom year of 1920. The most striking feature is the sharp improvement in working capital position of the company.

The annual report of the Howard Smith Paper Mills, Ltd., for the year ended December 31, 1923, shows considerably higher earnings than in either of the two preceding years. Net earnings, after depreciation and bond interest, were $442,560, amounting to 8.7 percent on the common stock.

The statement of the Saguenay Pulp and Power Co. and its subsidiaries for the year ended December 31st, 1922, made its tardy appearance at the end of February, and showed a deficit of $419,881, as compared with a surplus of $64,981 for the previous year. Gross revenue showed an increase of $764,613; but cost of sales and operating expenses increased by $1,970,122. Senator F. L. Béique, president of the company, stated that the company suffered from the low price of pulp during the first six months of 1922, and that it suffered still more from its connection with Sir Frederick Becker and his firms. He added that the tentative balance sheet up to October 31st, 1923, shows a large reduction in the liabilities of the company and that the earning power is excellent. It is hampered by lack of working capital and heavy sinking fund on the bonded indebtedness, and if the former could be increased or the latter reduced the position of the company would be materially improved.

The periodical merger talk concerning paper mills in the St. Maurice Valley was particularly active during and after the annual convention of the Canadian Pulp and Paper Association, when a large number of the executives of the chief Canadian pulp and paper companies were gathered in Montreal. The rumors have died down; but they are occasionally revived in another direction, the companies mentioned being Spanish River Pulp and Paper mills and Abitibi Power & Paper Co., the two largest newsprint producers in Ontario. No confirmation of any of the rumors can be obtained.

Embargo Question Still Paramount

The Royal Commission on Pulpwood has continued its sittings throughout the month of February, both in the East and in the West, and has heard a large number of witnesses. The opinions presented are very divergent; but on the whole

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ESTABLISHED 1844
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English Weave in
Two, Three, Four, Five and Six Ply
60 Inches to 176 Inches in Width
Fine Faced Felts for Fine Papers
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Have You Run Them?
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All Products Guaranteed to Suit You

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UNION BRONZE SCREEN PLATES

(Best phosphorized Cast Metal)

Old Plates RECLOSED and RECUT to accurate gauge
UNION BRONZE SCREWS for Screen Plates
Immediate Delivery of the Largest Orders. Satisfaction Guaranteed

The Witham Screen Plate Fastener, Patented

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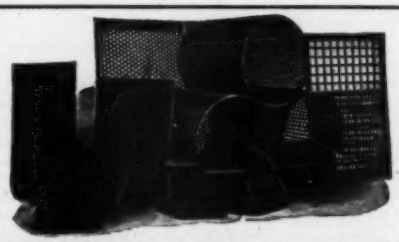

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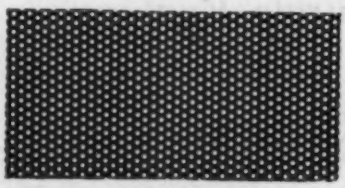

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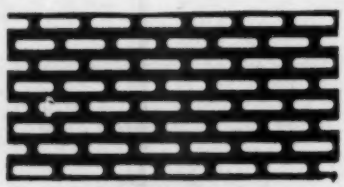

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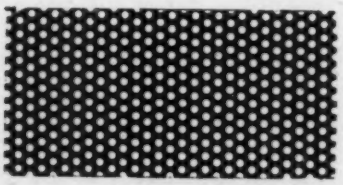

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Steel, Copper, Brass, Bronze and other alloys punched for Centrifugal and Rotary Screens, Pulp Washers, Drainer Bottoms, Filter Plates, etc.

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it may be said that the Canadian pulp and paper industry, speaking through the mouth of Edward Beck, secretary of the Canadian Pulp and Paper Association, has declared itself emphatically in favor of an embargo, whereas the pulpwood dealers are no less emphatical against it. The farmers side with the latter; but they would not have the least objection to the embargo if they were assured that the Canadian mills would take the wood they are now exporting across the border at the same price that is being paid by the American mills.

F. N. McCrea, M. P., president of the Brompton Pulp & Paper Co., declared himself in favor of an embargo on wood cut on Crown lands (which already exists in several provinces), but against extending it to freehold limits, on the ground that it would be an unwarranted interference with private rights. F. J. Campbell, general manager of the Canada Paper Co., refused to commit himself directly insofar as the embargo was concerned, but he contended that if pulpwood was allowed to cross over to the United States the same conditions should apply to book paper and other miscellaneous papers manufactured in Canada.

In the meantime, exports of pulpwood to the United States have declined considerably, showing that American mills are not very greatly alarmed at the likelihood of the embargo. The exports for January were only 79,405 cords, as compared with 133,328 cords for January, 1923.

On the other hand exports of paper and of pulp for the same month were valued at $10,900,050, a decline of $774,138 from the total for December, 1923, but an increase of $601,807 over January, 1923.

Plan Big Electrical Development

Extension of the Quebec Government's plans for the electrical development of the province, with the subsequent creation of industrial towns, is to be noticed in several measures which Hon. Honoré Mercier, Minister of Lands and Forests, has before the Quebec House this session, two of which have already gone through.

A bill was recently laid before the House providing for an increase to $3,000,000 in the sums which the Government can spend for the development of the waterpowers of the St. Maurice River and its tributaries, $1,100,000 having been voted in 1912, which amount was raised to $2,500,000 in 1918. The works on the St. Maurice comprise the huge Gouin dam at La Loutre, which impounds the largest mass of artificially stored water in the world; and the Government has drawn annually from its investment sufficient to pay interest, sinking fund, repairs and maintenance, and a considerable additional revenue.

The second bill deals with the power development at Lake Kenogami (which is in the Lake St. John district). In 1918 the Legislature voted $1,800,000 for these works, and it is now proposed to increase the amount by $950,000. The pulp and paper industry are especially interested in this work as most of the larger mills in the Province of Quebec are situated in the St. Maurice Valley or in the Lake St. John district. Price Bros. & Co., Ltd., have already contracted to take the greater portion of the power to be developed at Lake Kenogami.

$150,000 for Forest Protection

The Quebec Government estimates provide for an appropriation of $150,000 for forest protection for 1924, this being $75,000 less than last year. But in connection with the measure the Minister of Lands and Forests stated that he would later introduce a measure providing for a different system of forest fire prevention. The present system had worked out badly, admitted the Minister, and the intention was that the Government itself would see to forest protection.

There should be a uniformed body of fire rangers, supplied with all the necessary materials and equipment for fire fighting, and located in the heart of the forests. With this system would come all means of communication, such as telegraph, telephone or wireless. For this year, the Government believed it better to let limit holders look after their own limits, but everything would be under the control of the Government, and the Chief of the Forestry Service would be given control over the fire rangers of the different companies and associations.

On the 4th of February, the Garden City Press, Ste. Anne de Bellevue, P. Q., was the scene of a very pleasing ceremony. J. J. Harpell, president of the Industrial and Educational Publishing Co., publishers of numerous magazines, chief of which is Pulp and Paper Magazine of Canada, was fifty years old on that day, and the company's directors and employees at St. Anne and Toronto marked the occasion by presenting him with gifts suitably inscribed as an expression

FOR SALE

One 114″ Fourdrinier Paper Machine. Equipped with Pusey & Jones New Century shake; Fourdrinier; two presses; 48″ diameter dryers; calender, reel and Warren winder; self-contained Marshall drive.

One 72″ trim Fourdrinier Paper Machine. Equipped with two presses; twenty dryers 36″ x 76″; two stacks of calenders; reel and two drum winder; Marshall drive. Variable speed engine; pumps; Majestic Jordan, savealls.

Pusey & Jones Fourdrinier Part with New Century shake.

Four drum Moore & White winder.

Two Downingtown Iron tub beaters 52″ x 42″.

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Draper Hollow Balanced Brass Balls

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Absolutely balanced; will not pound out of shape

Specify these when ordering new pumps.

Order these to replace worn-out balls.

We make a specialty of repairing stuff pump balls.

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SOLID BRASS BALLS
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Every ball bears our registered trade-mark

FOR SALE

Two (2) Fitchburg Steam Engines 40 H. P., 125 lbs. steam pressure; 20 lbs. back pressure; 70 to 125 R. P. M. Length of engine, 12'6"; width of engine, 6'8". These engines can be direct connected or a belt drive and are in A-1 condition.

Three (3) Noble & Wood 1,000 lbs. capacity Beating Engines; wood tub; 48 x 48" roll; 72 x 16½" pulley. These Beaters are in good condition.

Two (2) 63" Smith & Winchester Undercut Paper Cutters.

Address Box 62, Paper Industry.

Claflin Continuous Beaters

Equipped with S K F Ball Bearings and Renewable Manganese Cast Steel fillings are unexcelled for

Increased Quality Production at Lowest Possible Operating Costs

Designed correctly
Built carefully *Delivered promptly*
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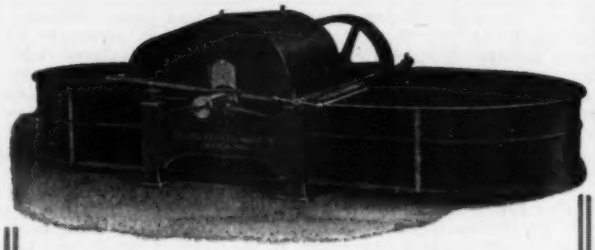


"Dayton" Beating Engines are Built for Heavy Duty

Dayton Beater and Hoist Co.
DAYTON, OHIO

TANNITE DECKLE STRAPS

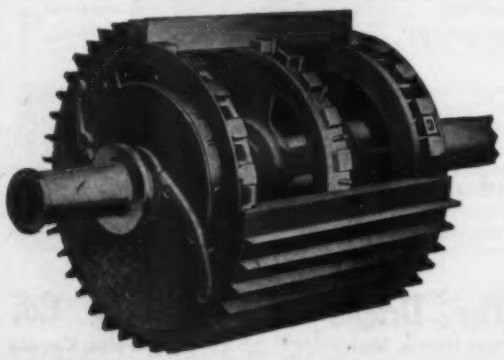
For Fourdrinier Paper Machines

A new improved product made with our new equipment by

STOWE & WOODWARD CO.

The Rubber Roll Makers

NEWTON UPPER FALLS, MASS., U. S. A.



Dayton Globe Iron Works

DAYTON, O.

We manufacture Beating and Washing Engines, Head Gates, Hoists and Gears.

Our Wedge Type Bandless Roll made of semi-steel with special alloy bars is practically indestructible.

of their good will. An address of congratulation to Mr. Harpell was read by Mr. J. M. Stephenson, secretary of the company and editor of the Pulp and Paper Magazine, in the presence of Mr. Alexander Longwell, the company's vice-president, the other directors and editors of the journals published by the company, and the members of the office and mechanical staffs. In the evening Mr. Harpell's residence was besieged by a band of masked men flourishing (toy) revolvers. When their disguises were removed they proved to be a score or more of friends and neighbors come to pay him a surprise visit of congratulations.

The annual financial report of the Laurentide Power Co., Ltd., a subsidiary of Laurentide Co., Ltd., for the year ended December 31, 1923, shows gross and operating revenue at the highest level in the history of the company. The settlement of income tax accounts and water rentals accounts for the years 1918 to 1922, the bond sinking requirements, and provision for 1923 income taxes left a balance of only $406,237 with which to meet dividend requirements of $525,000, leaving a debit balance of $118,763. Application of the previous balance of $69,238 and the withdrawal of $60,000 from contingent reserve created a balance of $10,474 at credit of profit and loss. The sale is based on the sale of 125,000 horse-power for the year. The company has installed a total of 165,000 horse-power. With the improvement in the water regulation of the St. Maurice River and the prospect of selling a certain amount of peak load power, it is expected that this extra 40,000 horse-power of capacity can be used to increase the income of the company.

Donnacona Paper Co. has recently brought an additional newsprint machine into operation and it is producing at the rate of about 60 tons a day. The cost of this machine was financed by a bond issue made a year ago. The new machine gives Donnacona a yearly output of 60,000 tons of newsprint. The company has made a re-arrangement of its capitalization. The authorized capital of $2,000,000 of preferred and $1,500,000 of common has been increased to $2,000,000 preferred and $3,000,000 common. At the same time the par value of the common stock has been decreased from $100 a share to $20 a share and a split up on a five to one basis is being made. No decision has been taken as to the issue of the additional $1,500,000 of common stock.

Abitibi Breaking Old Records

The big newsprint mill of the Abitibi Power & Paper Co., at Iroquois Falls, Ontario, is hanging up production records so fast that it is rather difficult to keep track of them.

On January 15th a daily record of 506.69 tons was made, which was bettered to 508.08 on the 17th; while on February 7th, 512.82 tons were turned out. On February 1, No. 1 machine turned out 86.07 tons as compared with its previous record of 83.35; and on the 7th, No. 7 machine produced 93.74 tons as against its previous best of 92.32. The crew are aiming at a 100-ton output for No. 7. The daily average for the week ended February 10th was 492.11 tons, six tons better than the previous record of 486.03 tons made last October.

The debenture and note holders of the Becker Wood Pulp Co., of London, England, which had large interests in the province of Quebec in connection with the Chicoutimi Co. and which decided on December 31st last to go into voluntary liquidation, have been told by the official receiver that their main chance of recovering anything was in the continuance of the Chicoutimi Co. It was admitted that the position of the Chicoutimi Co. regarding working capital was critical, but that the management in the face of grave difficulties was doing everything possible to prevent liquidation and was prepared to adopt a reasonable attitude towards the Becker Co. claims. The Becker failure is largely due to overtrading, followed by the usual consequences.

All the assets of Clark Brothers, Ltd., were sold on February 9th on a Supreme Court order to the Bear River Pulp Co., Ltd., a new company representing Chicago, New York and other interests. The purchase price included, according to the order of the court, $200,000 in cash and securities in the new company having a total par value of $1,300,000. C. W. Rantoul of New York, who will be the general manager of the new company, is expected to arrive at Bear River shortly.

The Shawinigan Water & Power Co., which is closely connected with the pulp and paper industry as it supplies a considerable amount of electric power to several large paper companies in the St. Maurice Valley, has completed the most

PIPE, VALVES AND FITTINGS
Carload each 5", 6", 8" and 10" Pipe. Also BOILERS, RADIATORS and Fittings.
5—5,000 gallon TANK CARS.
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MANUFACTURERS OF
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Pickles' Patent Automatic Steam Regulator
FOR
Paper Making Machines
Which absolutely control the drying of the sheet. Installed on sixty days' trial
W. F. PICKLES Buckland, Conn.

20 Per Cent Saving in Steam Guaranteed
The STICKLE COMPOUND CONDENSING SYSTEM and AUTOMATIC STEAM CONTROL for Paper Machines is guaranteed to save you 20 per cent in steam consumed for this purpose.
Our folder entitled "How to Dry Paper"—showing our Compound Condensing System for draining the dryers and heating the air with the discharge from the dryers to condition the machine room should interest you.
Send for this folder to-day
Stickle Steam Specialties Company
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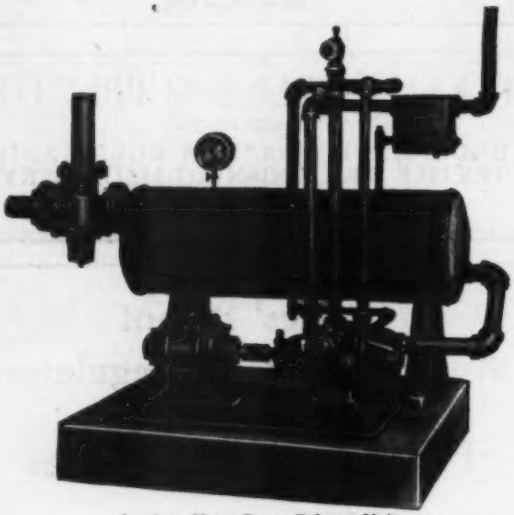
Simple and Economical System for Handling Condensate from Dryers Meeting with Great Success

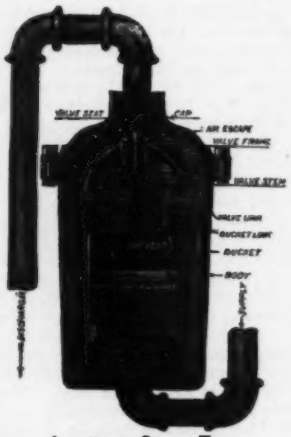


Jennings Hytor Dryer Exhaust Unit

This system comprises the **JENNINGS HYTOR DRYER EXHAUST UNIT** and the **ARMSTRONG STEAM TRAP with MY SPECIAL ARRANGEMENT OF PIPING,** an Armstrong Trap being installed on the return line from the condenser dryers with the main return header connected directly with the Jennings Unit, thus insuring circulation and highest efficiency of dryers.

A number of mills are using this system very satisfactorily.

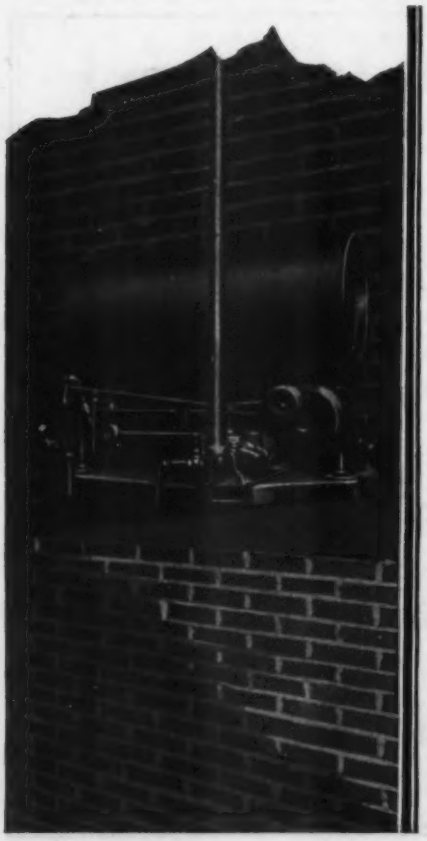
Full Particulars on Request by Addressing



Armstrong Steam Trap

THOMAS H. SAVERY, JR.

Suite 1524 Republic Bldg. **Chicago, Illinois**



Perfect Drainage Cuts Operating Costs

Fuel bills climb as condensation collects in your paper machines, dryers, evaporators and mill heating system.

Steam circulation becomes sluggish, the equipment is cooled, production drops.

Drain the condensation with a Morehead Back-to-Boiler System and these troubles will end. Steam will circulate freely, the interior surfaces will be dry and temperatures will jump to where they should be. Every pound of coal will do its complete job.

The hot condensate can be automatically fed to the boilers as feed water, saving the heat units above 212° and the steam used by pumps.

Morehead steam drainage specialists will gladly confer with you on any drainage problem. Write.

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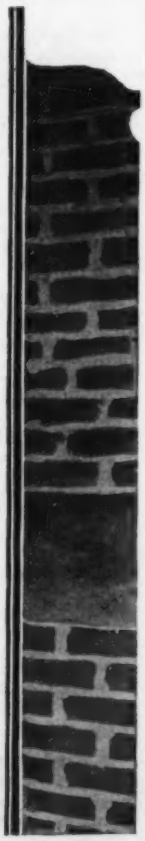
Morehead
"BACK-TO-BOILER-SYSTEM"
POSITIVELY DRAINS ALL TYPES OF STEAM APPARATUS. DELIVERS CONDENSATION AND FEED WATER TO BOILERS UNDER ALL CONDITIONS AT MAXIMUM TEMPERATURE



satisfactory year since its inception some twenty years ago. One of the most important developments of the past year was the rapid progress made with the installation at the Grès Falls, La Gabelle Rapids and Forges Rapids a few miles below Shawinigan Falls. The work is well ahead of schedule, and the first unit of 30,000 horsepower should be ready for operations early in April, with an additional 90,000 horsepower deliverable at the end of the year.

The annual general meeting of the shareholders of the Wayagamack Pulp and Paper Co., Ltd., was held at the head office of the company, Three Rivers, P. Q., on the 12th of February. The following were elected directors: Norman J. Dawes, C. H. Duggan, Hugh Mackay, K. C. Alex. Maclaren, Sir Wm. Price, Jas. W. Pyke, C. R. Whitehead. At a subsequent meeting of the directors Mr. C. R. Whitehead was elected president and Mr. Jas. W. Pyke vice-president.

There is no doubt that there has been, for several years, an enormous loss of timber through fires and indiscriminate lumbering, and that the country is tardily awakening to the serious problem of forest exhaustion. Every year for the last six or eight years, an average of $15,000,000 worth of timber has been destroyed through fire. That some drastic means must be devised to save the Canadian forests everybody agrees. It is up to the Provincial legislatures to enact such laws which would effectively protect the people's domain from oblivion.

Spanish River Pulp and Paper Mills, Ltd., recently added to their raw material reserves through the acquisition from the Ontario Government of 3,000 square miles of hand picked limits. This bring the holdings of limits by this company to over 20,000 square miles, a fact which relegates still further to the future the day when the shareholders will need to be concerned over the raw material problem.

At the luncheon of the Montreal Paper Club at the Mount Royal Hotel on the 14th of February, Robson Black, manager of the Canadian Forestry Association, made a strong plea for conservation and perpetuation of the forest, showing very clearly and forcibly the dire consequences which would inevitably follow the disappearance of the Canadian forests.

The stability of demand for newsprint at the present time and the fact that newsprint mills are heavily booked, indicate that production of this grade is likely to expand further in 1924. According to recent reports the Canadian mills are already booked for 94 per cent of their 1924 production.

The mills of the Chicoutimi Pulp Co. in the Saguenay district have been closed since the 4th of February owing to lack of water. Only a few employees have been kept on the staff. Operations are expected to be resumed early in April.

News Personals

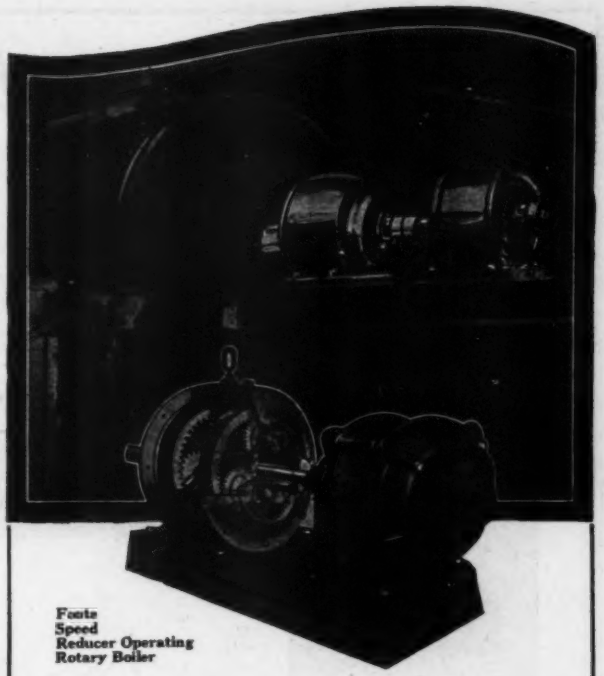
Mr. Charles B. Foster, for the past year and a half connected with the sales department of the Pejepscot Paper Company, has severed his connection with this company to become associated with the Carpenter Container Corporation, 1 Broadway, New York City.

Frederick C. Clark, vice-president and general manager of the Pejepscot Paper Company, announces that he has presented his resignation to Edgar Rickard, of New York, president of the company, the same to take effect as soon as arrangements for the change may be completed.

William F. Farren, well known in the local paper manufacturers' supplies trade through his connection with several leading concerns, is now associated with William Steck & Company, of 13 Park Row, New York, dealers in paper mill supplies of all description.

Mr. Robert R. Reed, for 13 years Ohio representative of the American Wood Pulp Corporation, has joined the sales force of the pulp department of Perkins-Goodwin Company.

L. M. Alexander, president of the Nekoosa-Edwards Paper Company, of Nekoosa, Wis., is spending the winter in Florida, expecting to return in April.



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Foremost Engineers Approve

FOOTE SPEED REDUCER

Engineering and Construction

WHEN the engineers of such companies as Ford Motor Co., Snoqualmie Falls Lumber Co., Indiana Portland Cement, Atlantic Elevator, Republic Chemical Co., Durant Motors, and innumerable others equally well known choose Foote Speed Reducers it is a high recommendation. It assures you that when you make Foote Speed Reducers your choice for reducing the speed and transmitting the power to your conveyors, mixers, agitators, etc., you are choosing wisely.

Foote Speed Reducers replace belting, chains, open gearing—creating greater production efficiency and worth while economy.

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Mfrs. of rawhide and bakelite micarta pinions and cut gears of all kinds.

250-260 N. Curtis St. Chicago, Ill.

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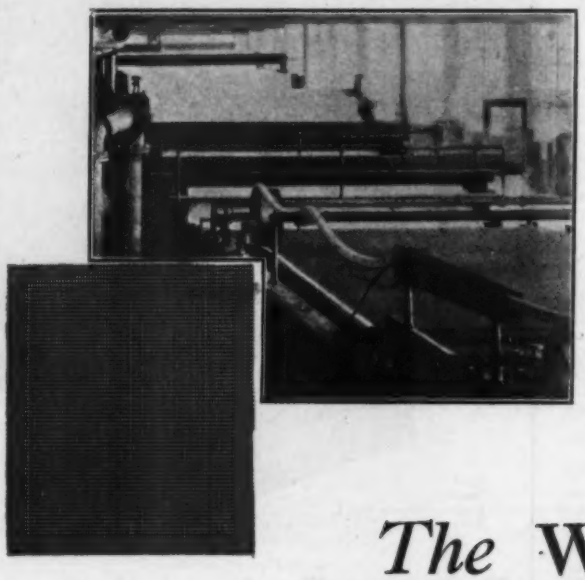
KING & KNIGHT, Underwood Bldg., San Francisco, Cal.

Smooth Fourdrinier Wire—



Of an even mesh, that does not groove the Suction Boxes and runs "smooth as silk" over them. No seams have to be cut, no Suction Boxes have to be planed, and you are assured of long life and increased production with CABBLE SUPERIOR FOURDRINIER WIRES.

Made of the highest quality brass or phosphor bronze, every length is tested before leaving our factory. Seams made to suit your individual requirements.

Let us fill your next order and show you what prompt service and fine quality we can give you.

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EXCELSIOR WIRE MFG. CO.
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BARRE GRANITE IN PRESS ROLLS

Is Revolutionizing the Whole Paper Making Industry

If your Paper Machines are not equipped with Press Rolls of BARRE GRANITE you are not getting the results that you should get, for it is a recognized fact that granite rolls are much superior to any others and Barre Granite the best of all. Let us tell you about them.

Jones Brothers Company
BARRE, VT. BOSTON, MASS.

Northwestern Superintendents to Meet

The officers and committees of the Northwestern Division of the Superintendents' Association are getting busy and arranging for their spring convention.

On November 18th the committee met at Stevens Point, Wisconsin, and decided to hold the spring gathering at Marinette, Wis., Friday and Saturday, May 2nd and 3rd.

Mr. A. G. Stone of Marinette was selected as general chairman and has arranged to appoint his committee members immediately. As soon as they have accepted, a list of those who will put on the event will be published.

Marinette and Menominee mills, also those at Peshtigo and Octonto Falls, are expected to be open to association members on the days mentioned and a real live program for the two days is promised.

An agreement has been reached between the city of Fort William, Ontario, and the Great Lakes Pulp and Paper Company, whereby the latter will undertake the erection of a plant within the city to cost not less than $3,000,000, one unit of which, the pulp mill, to cost $800,000, shall be completed and in operation within one year, and the paper mill, to cost $2,200,000, is to be completed and in operation within two years. The plant will have a capacity of 100 tons of newsprint daily and not less than 600 men will be employed for 250 working days each year.

Outagamie Co. Taken Over by Patten Paper Co.

Entire control of the Outagamie Paper Company, Kaukauna, Wis., has been purchased by the Patten Paper Company interests, headed by Judson G. Rosebush, of Appleton.

The Patten interests and eight other stockholders owned all the stock in the mill, and Mr. Rosebush has now acquired the interests of the other eight. Mr. Rosebush was formerly vice-president of the company.

The Brown Paper Mill Company, of Orange, Tex., are building a mill in Monroe, La., and have awarded a contract for another building to the Morton C. Tuttle Co., of Boston, Mass., on which work will be commenced at once.

A New Machine to Speed Up Beating

The great hue and cry in the paper industry today is "Speed up production on the paper machine," and when this is done, it is necessary to have more beating capacity. Recently the writer had a talk with a prominent paper mill manager, and he stated that he thought the big problem in most mills was some way to increase capacity in the beaters, and the only way he knew of was to speed them up.

In other words he thought the faster the roll run on the beater, the greater would be the capacity, and this is no doubt true.

In the February issue of this journal, Mr. Wm. Nash, the well known paper mill superintendent, wrote "A man must have very good judgment to handle different kinds of stock in the beater. He must depend on the feel and the smell of the stock for results, but how many men can you find that will be particular enough in these days to watch every beater, day in and day out, the year round."

In other words, he meant to convey the idea in his article that it was impossible to keep stock uniform all of the time, and particularly when there are three different men running the beaters every twenty-four hours.

The raising and lowering of the roll on the beater is simply guess work, and no matter how careful a man may desire to be, he will not guess exactly as the man on the shift before him.

Then, it would seem that there is a great demand for some method of handling the roll on the beater so that one can always know just where it is, and how far the bars are from the bed plate, without any guessing. When you add to this the trouble of raising and lowering the roll on the average beater, and the time it takes, and the occasional accident in doing so, it will be seen that there is a great need for a mechanical device that will do this work.

Such a device has now been put on the market by the Griley-Unkle Engineering Co., with offices in the First National Bank Bldg., Fort Wayne, Ind., and is known as the Unkle Improved Roll Raiser.

The machine is a very simple device, with which a man can raise and lower the roll on any beating engine by using one finger to turn the little lever shown at the end of the accompanying illustration. When the lever or handle is turned, the roll either raises or lowers as far as it has been set to go cutting out automatically without supervision at any desired position. Therefore any number of men could change or handle the roll and all of them put it in the same

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Eleven Years Continuous Service— Still Going Strong!

Paper Mill drives are notoriously hard on belts and belt joinings. They demand all that a belt fastener can give. Because Crescent Belt Fasteners insure a **permanent** joining for all open drives is why they are the first recommendation of belting manufacturers.

CRESCENT

Make Good Belts Give Better Service

BELT FASTENERS

Standardize on Crescent Belt Fasteners to eliminate belt joint trouble and save power, money, time and labor. Send for "The Dollars and Sense of Better Belting Service."

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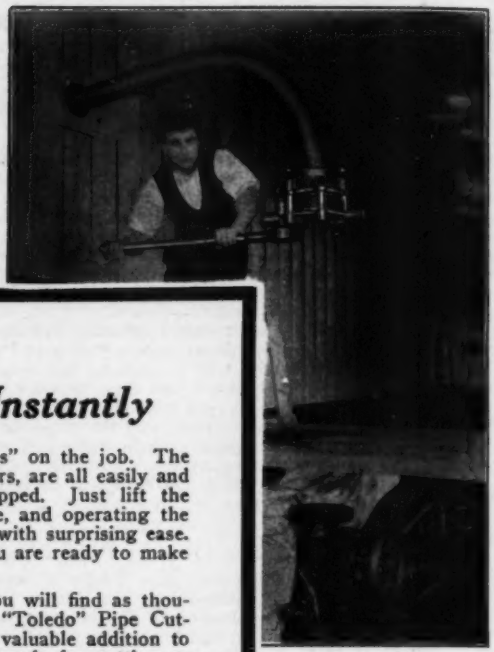
Write your name and address on the margin of this ad and send to us. (5)

"TOLEDO"

The Name and the Trade-Mark appearing on all genuine "Toledos" is a guarantee of "Toledo" quality.



Anywhere—A "Toledo" Does the Piping Job Instantly

"Toledo" Tools connected to a "Toledo" Power Drive. Swift and Efficient Power Machines.

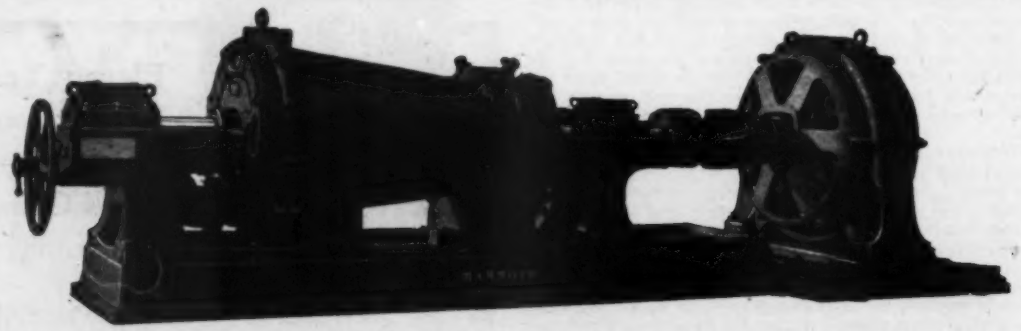
No worry, no trouble, no delay with "Toledos" on the job. The broken steam line, change in equipment or repairs, are all easily and quickly handled when you are "Toledo" equipped. Just lift the light, portable tool on the pipe, bolt it in place, and operating the ratchet handle you cut off the pipe or thread it with surprising ease. In a few moments the job is completed and you are ready to make your connections.

Nothing could be easier, and you will find as thousands of others have found, that "Toledo" Pipe Cutters and Threaders prove a most valuable addition to the plant's equipment. They are made for cutting or threading all pipe up to 12".

A postcard will bring you our complete catalog.

THE TOLEDO PIPE THREADING MACHINE CO.

Toledo, Ohio **New York Office, 50 Church St.**



The proper size Jordan which should be used for a given stock is a subject which should be carefully considered.

Size depends, of course, not only on the character of the stock, but also on the amount of stock and the nature of the refinement necessary. Another factor to be considered is the amount of power required to operate a larger or smaller Jordan efficiently, in proportion to the tonnage of stock required. These are only a few points to decide.

Each mill presents a different problem, requiring individual consideration. Considerable assistance in solving such problems is offered in our six sizes of Jordans, and our experience as Jordan builders for over 30 years. May we help you with your problems?

The Noble & Wood Machine Co., Hoosick Falls, N.Y., U.S.A.

Built in Canada by the Port Arthur Shipbuilding Co., Ltd., Port Arthur, Ontario

position, and produce the same stock, which is impossible when only guess work is used.

By always having the roll gauged or set for the best position, the beater will naturally produce its largest possible output every day, and this will materially help production.

The Kenwood Guard Board

Close study of jacket and couch conditions in many mills has enabled the F. C. Huyck Co., felt and jacket manufacturers of Albany, N. Y., to devise a guard board for jackets which is based on sound and logical principles. This guard board has been tried in a number of mills and has proved satisfactory. Installation of one was made in the Laurentide mill last Sunday on number seven machine.

The guard board on a jacket is there for the purpose of squeezing as much as possible out of the jacket before the jacket comes in contact with the formed but still very moist sheet of paper. The sheet passes through a press whose top roll is covered by the jacket. The amount of pressure that it is possible to give the sheet in passing through this press must be finely regulated by adjustments, and if the jacket carries only a trifle of additional moisture it will displace the fibres in the formed sheet and make a fault in the paper which spoils it. So the guard board which takes this moisture out of the jacket is a most important part of the machine.

The pressure of the guard board on the jacket has always, up to now, been regulated by several screws at uniform distances apart across the jacket. While it was desirable that the pressure across the entire width be uniform, this adjustment was at best a matter of guess. The Kenwood board insures that the pressure of the guard board on the jacket will be uniform throughout by eliminating the adjustments guess. It is believed by the designers of this new device that many jacket troubles were caused by the irregular pressure on the jacket of the old guard board, and that the jackets will now go to the end of their usefulness without the need of local adjustments in the width of the board.

The A. P. W. Paper Company, of Albany, N. Y., is perfecting plans for the construction of a new pulp mill on timber properties recently acquired near Sheet Harbor, Nova Scotia, totaling more than 50,000 acres. The mill will consist of a number of buildings with power house, and is estimated to cost about $260,000, with equipment. It is expected to commence work early in the spring.

Obituaries

Samuel W. Butterfield

For many years connected with paper mills in New England as a construction engineer and known as a builder and designer of some of the largest paper plants in this district, Samuel W. Butterfield died February 22 at his home in West Somerville, Mass. He was a construction engineer with the International Paper Co. and designed some of their New England paper mills and lumber mill properties both in the United States and Canada. Mr. Butterfield was born in 1834. A daughter and a brother survive him.

Henry T. Maynard

Henry T. Maynard, 51 years of age, organizer of the Converters Paper Mills and well known in the New England paper trade, died at his home in South Sudbury, Mass., on February 16, following a two days' illness. Mr. Maynard is survived by his wife and two children, a son and daughter.

PIPE, VALVES and FITTINGS

In order to reduce our surplus, we are quoting attractive prices on Standard and Extra Heavy, Flanged and Screwed in sizes from ¼" to 24" diameter on Pipe, Valves and Fittings.

Pipe in all sizes cut and fabricated to specifications. Also pipe for rolls cut.

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Steel Plate Construction
Steel Storage Tanks, Blast Furnaces, Gas Holders
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Steel Transmission Towers
RITER-CONLEY COMPANY
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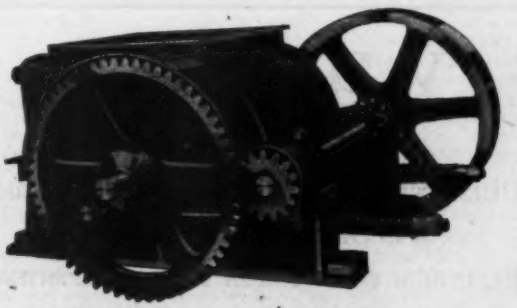
A Change in Name

The HILL CLUTCH MACHINE & FOUNDRY CO.
CLEVELAND, OHIO

Changed from
THE HILL CLUTCH COMPANY

To more firmly establish in the minds of our valued business friends, and prospective customers, that we manufacture "not only friction clutches" but a complete line of

POWER TRANSMISSION MACHINERY
FOR
BELT, ROPE, AND GEAR DRIVES.
GEAR SPEED TRANSFORMERS.
AUTOMATIC BELT TIGHTENERS
SPECIAL MACHINE WORK TO CUSTOMERS' SPECIFICATIONS.
FINE GRAY IRON CASTINGS.



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will insure a regular supply of properly sized coal for your automatic stokers at a low cost per ton.

They are built in single and double roll types, in capacities to handle 30 to 200 tons per hour.

Shall we send you our catalog showing our various types and sizes of coal crushers?

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You can remove damp steam as it forms; prevent roof drips; dry sheets evenly; reduce felt and press roll crowning bills; and increase production and profit by installing a Sturtevant System.
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ENGINEERS & CHEMISTS INDUSTRIAL DESIGN PLANT IMPROVEMENT LABORATORY TESTS

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Complete Pulp & Paper Mills, Investigation of New Enterprises, Special Heat & Power Applications, Hydro-Electric Developments, Steam-Electric Power Systems, Sectionalized Paper Machine Drives.
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THE
MANAGEMENT ENGINEERING AND DEVELOPMENT CO.
7TH FLOOR CITY NATIONAL BANK BLDG.,
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H. B. Wadsworth, Inc.
Export *Domestic*
Pulp and Paper
Paper Making Machinery
Mill Supplies, Etc.
51 East 42nd Street
NEW YORK

New York, March 1, 1924.

TAKING all the reports received from various corners of the trade, weighing them carefully and analyzing the situation, it would seem as if demand for paper is developing in fair volume. It is true that the market is not near so active as manufacturers and jobbers would like to see it, but it is also true that most mills in the different parts of the United States are managing to keep fairly busy, that they are finding an outlet for the great bulk of paper being produced, and that, viewing matters in the aggregate, the movement of paper of all kinds into consuming channels is well up to normal, if not in excess of normal if the normal of pre-war days is taken as a basis.

Some descriptions of paper are in relatively much slower call than others. In fact, it might be said that the market is somewhat divided as it shapes up at present. There are several kinds of paper which are in heavy demand, with consumers buying in consistent fashion and in tonnage substantially above an average over a period of years, whereas other papers are comparatively neglected with users absorbing supplies in small amounts and with foreign competition helping to make the market everything but satisfactory to domestic manufacturers. News print is active and is being consumed in close to record volume; demand for building papers holds up well to a high level, and there is a very good movement of bag paper and a fair call for fine papers of most qualities. On the other hand, coarse papers are relatively quiet, and there is nothing extraordinary about the demand for book paper. Tissue is wanted in limited quantities, and some specialties are lacking a normal market.

Obviously, however, one thing offsets another. Taking the tonnage of consumption as a whole, it is probable that paper production in this country at present is fully up to normal, if not somewhat in excess of normal, and a pleasing feature is that demand generally is gradually expanding. Furthermore the increasing demand is the direct result of a growing consumption. There are very few users of paper buying for stocking up purposes today; jobbers also are keeping their shelves and storerooms rather bare of stock—there is every indication that consumers and dealers are willing to let manufacturers carry any stocks under prevailing circumstances that are warranted. Such demand as is arising is coming straight from those having immediate need of the paper ordered, and in this is a healthy note sounded for the present constituted market and a prospect of broader business in the future.

An important factor in the situation is the sharp advance in many paper-making materials in the past few weeks. Practically every description of raw stock used by paper manufacturers with the possible exception of wood pulp has risen in cost recently, and the rise has been of no mean proportions. Rags have soared to where prices are in some instances 150 per cent above the levels prevailing only a couple of months ago. Waste paper is higher, and so is old rope and bagging. Ground wood shows an advancing tendency, and at least certain kinds of chemical pulp—kraft in particular exhibits a stronger price tone. Throughout the advance in raw material prices of paper have scarcely budged; in fact, such changes as have been recorded have been mostly in a downward direction. Mills in some cases are marketing paper at a loss to themselves, and it can be said, probably without fear of contradiction, that nearly every domestic producer of paper is operating today on a scale which nets very little or no profit.

This condition cannot continue indefinitely. Either a decided reversal in the raw material trend will have to take place or else paper values will have to move up to meet the increased cost of production. Manufacturers as a rule are hesitant to raise prices of their finished product in the fear they might deter demand, but it stands to reason that the appreciable increase in manufacturing costs cannot but have a bullish influence on paper prices, and there are many in the industry who believe that the paper market is at the moment on the threshold of a sharp advance which will involve practically all kinds of paper.

Newsprint is still in a stronger market position than any other class of paper. Publishers are absorbing supplies of print paper in a consistent manner and consumption is holding to the high marks reached in the closing months of 1923. Mills almost as a unit have their full production for the first half of this year sold on contract, and not only are newspaper proprietors readily taking all the paper coming to them on back commitments, but they are frequently entering the spot market to augment their supplies. It has become literally a habit with many newspapers to omit advertisements from their issues; this implies that publishers are printing as large issues as their paper supplies will allow, and that they are omitting advertising rather than endanger themselves by using up newsprint at too rapid a rate.

Book paper demand has shown some slight improvement. The great fault in this branch of the industry, from all appearances, is that the productive capacity of mills of the country is too great in comparison with the prevailing consumption of book paper. Not enough business is available to keep all plants operating full and there is consequently keen competition among manufacturers to secure as large a proportion of the orders placed as they can, so that some price cutting is resorted to. Machine finished book is quoted at 6 to 6.25 cents per pound f. o. b. New York on an average, though some sales at a little under these prices are noted from time to time. On the other hand, the better qualities of book paper are bringing higher prices. Coated book paper is quoted at from 8 cents a pound upward f. o. b. New York.

Writing papers are firm and tending to advance. Mills in New England are finding it necessary to gradually increase their output, and some are marking up quotations. Reports tell of fine paper manufacturers in the Middle West enjoying favorable market conditions.

Wrapping and other coarse papers have steadied. No. 1 domestic kraft wrapping is quoted at 6 to 6.25 cents a pound f. o. b. New York, and in at least some quarters it is stated that competition of the foreign product is not quite so keen. Tissues are in routine demand only, with No. 1 white tissue quoted at 75 to 80 cents a ream f. o. b. New York.

Box boards are moving in steady fashion but in limited tonnage. Consumers are proceeding as buyers on a hand-to-mouth scale, and manufacturers are leaving nothing undone in their efforts to obtain as big a part of the business placed as they can possibly get. The result is prices are fluctuating frequently but on a rather narrow range because board prices are on a level where there is scant room for a decline. Plain chip is quoted in the East at around $42.50 per ton f. o. b. New York, and filled news at $45.

Simonds Writes Book on Business Fundamentals

Mr. Alvan T. Simmonds, president of the Simmonds Saw and Steel Company, is the author of a new book entitled, "Business Fundamentals." Mr. Simmonds has long been an ardent student of economics and has attracted nation wide attention through his yearly Economic Essay prize contest among high and technical school students.

In this book he has grouped the fundamentals of a fully successful business into 100 principles. The following is taken from the preface: "The best way to build up a true theory of business is by study of the acts of successful business leaders. Practical men listen gladly to such men as Gary and Schwab whenever they talk of the principles they have learned in connection with their work and the applications which they have made.

"Selecting the hundred most important principles of business is like selecting the hundred best books or the hundred greatest men. The choice will depend upon the chooser—his experience and environment. The author of this book might, some years from now, choose somewhat differently, omitting here and adding there as his point of view might change and new developments might arise in business. The list as it stands, however, represents the essentials of business as we know it today. Furthermore, while it is possible that some of the principles here set down as fundamental may not apply to business a century hence, they are very certain, in the author's opinion, to apply for the next fifty years or more, so that any knowledge gained from reading this book is not likely to be out of date until most of its readers have transferred their businesses to another world."

The Ronald Press Company of New York City are the publishers of this book.

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"Distinguished for its High Test and Uniform Quality"

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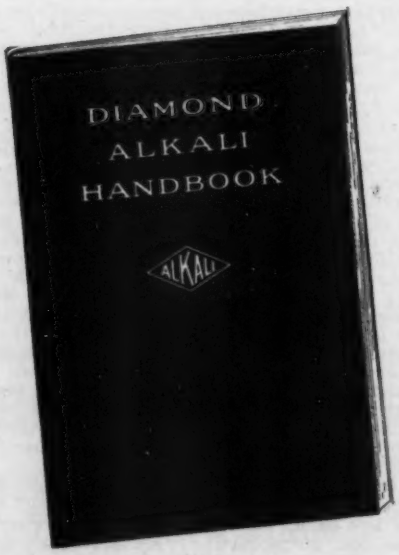
NOT a catalogue. A handbook of practical information of value to users of Alkali. Contains many valuable tables and suggestions relating to the proper usage of Diamond Alkalies.

Copies available to those interested upon request.



DIAMOND ALKALI COMPANY

PITTSBURGH, PENNA

Domestic Raw Materials

Papermaking Rags

Of all the various raw materials of which paper is made, rags continue in the strongest market position. There has been some easing of prices on the low grades of papermaking rags but the market as a whole retains its firm tone and some descriptions of rags are tending higher. Demand for most grades is active and conditions at the supply source are such as to add to the market firmness.

There are numerous indications that the consumption of rags in the United States during the last several months has been of such magnitude as to remove about all of the surplus stock that was held at collection sources and by dealers and mills. Not only have supplies in this country been greatly reduced but stocks abroad have been heavily drawn on, and the statistical position of papermaking rags is doubtless stronger today than has been the case since the war period. This condition can be attributed chiefly to the situation that has existed in the roofing paper industry in the United States in the last few months. Felt paper manufacturers have experienced excellent business—probably never before have the roofing paper mills of the country been quite so fully engaged all at once as they have been in the last half year or so—which has led to a tremendous consumption of rag stock. The open winter over most of the country has permitted building operations to go on without much interruption, and it is well known that construction in recent months has been above all previous records. Not only has domestic consumption of roofing and other building papers been at the top-notch, and a little better, but manufacturers have received orders for large quantities of such paper from abroad, Japan among other countries having been a heavy buyer of roofing materials in the United States.

In addition to this the factor of high cotton prices has had an important bearing on the rag market. Consumption of many grades of cotton rags has increased tremendously as a result of the high cost of raw cotton, rags being ground up into cotton shoddy and re-spun into yarn as substitutes for the virgin staple, and this has removed big quantities of rags from the market which otherwise would have found their way into paper mills.

The rag situation in Europe is, to say the least, very firm. American importers have been buying across the Atlantic at a rate in recent months which has greatly diminished stocks in the various European countries, and dealers there are said to be now asking prices which in frequent instances are beyond the market levels prevailing here. Moreover, importers report that the volume of supplies offered them from abroad reflect perceptibly the low level of available stocks in Europe. Where dealers on the Continent ordinarily have 100-ton lots to sell, they are at present confining their offers to 25 and 50 tons at a time, and with these conditions obtaining, the European seller of rags is enabled to adopt a very independent attitude with regard to prices and to hold out for the rates quoted.

It is likely, in fact, that there are already some evidences to be noted, that the high prices prevailing on rags will stimulate collections and bring out increased supplies. This is invariably the case. But the question arises of how much can supplies be enlarged? High clothing prices necessarily reduce the supply of rags since the public must wear garments longer than ordinarily. High prices of cotton cloths mean that less goods are cut up into wearing apparel, and the general unfavorable financial situation in the countries of Europe automatically reduces the supply of rags because the people of those countries are unable to buy and wear as many garments as when economic and industrial conditions are better, and therefore have less clothing to discard.

Of course, this is the time of the year when rag collections usually are the lowest. Weather conditions retard collection operations as dealers are not able to cover much ground. As the spring draws nearer it is probable collections will increase, which, it is to be hoped, will relieve the present pinched supply condition, especially in the low qualities of rag stock which have been in principal demand.

Roofing rags soared in price early in February to where sales of No. 1 packing were made at close to 3 cents per pound f. o. b. New York, and of No. 2 grade at 2.70 cents at dealers' shipping points. About the middle of the month felt paper manufacturers mostly withdrew from the market and prices declined somewhat. Since then the tone has been rather unsettled with prices fluctuating in an irregular fashion. No. 1 roofing stock is quoted at present at around 2.60 cents a pound at shipping points, and No. 2 packing at 2.45 cents.

Other grades generally hold steady in price. Old thirds and blues are especially firm, with dealers quoting repacked blues at 3.50 to 3.75 cents a pound at shipping points, and miscellaneous or rough packing at 3.25 to 3.50 cents. Old white rags are quoted at 7.50 to 8.50 cents per pound at shipping points, depending on the quality of packing, for No. 1 repacking whites; 4.50 to 5 cents for No. 2 repacked, and 6.75 to 7.25 cents for No. 1 miscellaneous whites.

New cuttings are steady in price with some grades quite scarce and with consumers other than papermakers absorbing such rags in good amounts. No. 1 white shirt cuttings are quoted at 14 to 14.50 cents per pound at shipping points, fancy shirt cuttings at 7 to 7.50 cents, unbleached muslins at 12 to 12.50 cents, washables at 5.50 to 5.75 cents, light silesias at 9 to 9.25 cents, blue overall cuttings at 9 to 9.50 cents, and black silesias at 5.50 to 5.75 cents.

Average quotations f. o. b. shipping points and ex dock, some of which are more or less nominal, follow:

New Stock—	New York and Chicago
White shirt cuttings, No. 1	14.00-15.00
White shirt cuttings, No. 2	6.75- 7.25
Fancy shirt cuttings	7.00- 7.50
Washables, No. 1	5.50- 5.75
Unbleached muslins	12.00-12.50
White lawns	11.50-12.00
Overall cuttings, blue	9.00- 9.50
Black silesias	5.50- 5.75
Light flannelettes	10.00-10.50
Canton flannels, bleached	11.75-12.00
Canton flannels, unbleached	11.25-11.50
Shoe cuttings, bleached	10.00-10.25
Shoe cuttings, unbleached	9.00- 9.25
Light silesias	9.00- 9.50
O. D. khaki cuttings	5.75- 6.00
Mixed khaki cuttings	5.25- 5.50
Corduroy cuttings	4.25- 4.50
Cottonade cuttings	4.75- 5.00
Linens, No. 1 white, foreign	16.00-17.00
Light prints, foreign	6.50- 7.00
Old Stock—	
Whites, No. 1, repacked	7.50- 8.50
Whites, No. 2, repacked	4.50- 5.00
Whites, house soiled	3.60- 3.75
Whites, street soiled	3.25- 3.50
Lace curtains	4.75- 5.00
Thirds and blues, rough	3.25- 3.50
Thirds and blues, repacked	3.50- 3.75
Black stockings	4.00- 4.25
Cotton canvas, No. 1	4.75- 5.00
White cotton batting	6.25- 6.50
Roofing, No. 1	2.60- 2.75
Roofing, No. 2	2.40- 2.60
Dark colored cottons, foreign	2.40- 2.50
Blue linens, foreign	5.00- 5.50
Gray linens, foreign	6.50- 7.00
White linens, foreign	11.00-11.50
Light prints, foreign	4.00- 4.25

Rope and Bagging

The feature of the old bagging market has been the sharp advance in prices of roofing bagging. Sales of this material have been recorded at 1.60 and 1.70 cents per pound f. o. b. shipping points, and prevailing market prices are but slightly below these figures. dealers as a rule asking at least 1.50 cents per pound. With bagging for roofing paper mills commanding such stiff prices, packers have not been sorting No. 1 scrap bagging, finding it more advantageous to ship all the old bagging coming in to them to roofing mills. Therefore prices of No. 1 scrap bagging are largely nominal at around

Established 1895

Daniel M. Hicks
Incorporated
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Paper Makers Supplies
200 Fifth Avenue
New York

Foreign and Domestic
Cotton and Linen Rags and Cuttings—Waste Paper — Pulp — Cotton Waste — Bagging — Rope — Strings — Flax, Jute, Hemp and Silk Wastes.

JOSEPH GATTI President and Treasurer

GATTI Paper Stock Corporation
Formerly with the Gatti-McQuade Co.

Paper Manufacturers' Supplies

COTTON AND WOOLEN WASTE

All Grades of Rags and Paper Stock, New Wrapping Paper, Box Board and Cordage

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News Blue
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We Supply a Complete Line of Domestic and Imported

Aniline *and* Pigment Colors

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SPECIAL SHADES OF COLORED PAPER OR SAMPLES OF DYE-STUFF MATCHED AND COMPLETE FORMULAS FURNISHED

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MITTS & MERRILL GRAVITY FEED SHREDDER

Reduces Paper Stock

Magazines, books, old paper and boxboard, frozen or dried pulp laps run through the Mitts & Merrill Gravity Feed Shredder are reduced to particles which hydrate readily when put into the beaters.

Built in six sizes with spouts ranging from 18" to 45" wide

Reduces Costs

Because shredding in the Mitts & Merrill Gravity Feed Shredder expedites hydration in the beaters there is considerable saving made in power. Thus we see that the shredder here illustrated reduces costs while it is reducing paper stock.

We will be glad to furnish details upon request.

We also build a 100% efficient "Hog" to reduce pulp mill bark and wood refuse

MITTS & MERRILL 1013 Tilden St. **SAGINAW, MICH.**

1.50 cents per pound, with few sellers having stocks to offer.

Old rope is in steady demand and quotably firm. Not much change has developed in prices though the tendency is unmistakably upward. Dealers assert that incoming supplies do not begin to measure up to normal quantities, and that considerable difficulty is encountered in locating usual amounts of old rope abroad. Domestic manila rope in No. 1 condition is selling at 6.50 to 6.75 cents per pound at shipping points, with most dealers asking and receiving the higher figure, while foreign manila rope is fetching around 6.25 cents ex dock New York or other American Atlantic ports. Old strings are firm and in good movement to paper mills, mixed strings bringing from 1.25 cents a pound up to 1.50 cents, depending on the quality of packing.

F. o. b. shipping point quotations follow:

	New York and Chicago
Gunny, No. 1 domestic	1.50-1.65
Gunny, No. 1 foreign	1.45-1.60
Scrap bagging, No. 1	1.50-1.75
Roofing bagging	1.50-1.65
Wool tares, heavy	1.60-1.75
Wool tares, light	1.50-1.60
Manila rope, No. 1, foreign	6.25-6.50
Manila rope, No. 1, domestic	6.50-6.75
Sisal strings	2.25-2.50
Mixed strings	1.25-1.50

Old Paper

Old paper prices rule generally steady with such changes as have occurred mostly in an upward direction. The market in the Middle West is still higher than that in the East, but prices in New York and other Eastern centres have advanced on some grades owing to Western board mills placing orders in the East for supplies. It might be said that the market tone is rather divided. Low grades are on the uptrend under a fairly consistent movement into consuming channels, whereas some of the high qualities are noticeably neglected by buyers and are tending lower in value. This is probably a reflection of the wood pulp market, as paper and board manufacturers find it more to their advantage to use pulp at present costs than to substitute the better grades of waste paper.

Folded newspapers are selling in the East at about one cent per pound f. o. b. New York, and in the West this grade of old paper is bringing 1.25 cents a pound and higher. No. 1 mixed paper has sold at 1.15 cents a pound in the West and in the East sales at 80 and 85 cents a hundred pounds are reported. Shavings are unusually quiet. Hard shavings are next to unsalable and No. 1 packing is available to mills at 3.75 cents f. o. b. shipping points, while No. 1 soft white shavings are wanted in limited quantities at prices ranging around 3 cents per pound at shipping points. Old magazines are quoted at 1.60 to 1.75 cents at dealers' points for heavy No. 1 books, and ledger stock is selling at 1.85 to 2 cents per pound. Old kraft paper is firm at 2.25 cents f. o. b. shipping points, and another firm grade is white blank news cuttings, which are fetching 2.20 to 2.30 cents.

F. o. b. shipping point quotations are:

	New York and Chicago
Hard white shavings, No. 1	3.75-4.00
Hard white shavings, No. 2	3.25-3.50
Soft white shavings	2.90-3.15
Colored shavings	1.60-1.80
Heavy book, No. 1	1.60-1.80
Crumpled book, No. 1	1.30-1.40
Ledger stock	1.90-2.15
Kraft, No. 1	2.20-2.30
Manilas, No. 1	1.10-1.35
White blank news	2.20-2.30
Over-issue news, No. 1	1.10-1.35
Folded news	1.00-1.25
Mill wrappings	1.00-1.15
Mixed paper, No. 1	.80-1.15
Common paper	.55- .65

Chemical Pulp

While there seems every reason to believe that wood pulp prices have at last reached bottom for the present movement, with some classes of pulp inclined to show a much steadier tone, prevailing market conditions are anything but satisfactory from the seller's standpoint. For that matter, the pulp situation is causing consumers as well a good deal of anxiety. Most buyers are proceeding along very conservative lines, seldom placing orders for other than hand-to-mouth supplies, and generally insisting on price concessions before purchasing.

The complexion of the market is unquestionably improved.

Paper Stock
Now Is the Time to Buy Our Raw Materials
Out of the forty different kinds of paper stock graded in our many large warehouses, you are assured a steady, reliable source for procuring raw materials in practically every branch of paper making.
Having specialized for 35 years in this one field you can depend upon a clean, well-packed, uniform product throughout; fulfillment of delivery promises; and because of our output of 300 tons daily, big tonnage at all times.
Write us your wants and we'll gladly send further information.
Mendelson Bros. Paper Stock Co.
910 South Michigan Avenue, Chicago, Ill.
Long Distance Phones: Harrison 2840 and 5557.

The Sphinx Says:

"There may be a great difference between the price of size and the cost of sizing."

"Reliable" Rosin Size

All that the name implies

The Arabol Manufacturing Co.

Executive Offices: 110 East 42nd Street
NEW YORK

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WORKS—WESTFIELD, MASS.

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ANIMAL SIZING GLUE STOCK

LARGEST SPECIALISTS IN AMERICA ON

FINE WRITING PAPER SIZING

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STANDARD BLEACHING POWDER

Manufactured by

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"MICHIGAN" Combination Steel and Wood Pipe

LONG DISTANCE CONVEYOR OF WATER AND PAPER STOCK IN PAPER AND PULP MILLS—Specially Adapted to Carry Sulphite, Ground Wood and "White Water"

Eighteen reasons why you should use "Michigan" combination steel and wood pipe

1—Durability of Wood Shell. 2—Sanitary. 3—20% more capacity than Cast Iron Pipe. 4—Simplicity in handling. 5—Light in weight. 6—Speed in laying. 7—Protects against freezing. 8—Not affected by Electrolysis. 9—Rigid inspection of materials. 10—Efficient construction of stave. 11—Strength of steel banding. 12—Protection of banding with asphalt coating. 13—Cannot burst under pressure. 14—Can be laid in a wet trench. 15—Short curves without specials. 16—Low installation and maintenance cost. 17—Responsibility of company. 18—Not affected by sulphur or chemical solutions.

THE MICHIGAN PIPE COMPANY

Dept. 17 BAY CITY, MICHIGAN

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Oklahoma City, Okla.....105 West 16th St.
Chicago, Ill.....Leiter Bldg., 15 East Van Buren St.
Boston, Mass.....Room 737, Oliver Bldg.
Cleveland, Ohio.....919 Ulmer Bldg.
Chattanooga, Tenn.....702 James Bldg.
Philadelphia, Pa.....318 Widener Bldg.
Pittsburgh, Pa.....823 Fulton Bldg.

"Steel for Strength—Wood for Durability"

Producers are not bringing so much pressure to bear on users to buy, and indications are that the prevalence of prices on low levels—levels which many manufacturers declare are below the cost of production—is evidently having the effect of causing pulp mills to regulate their output more in keeping with the wants of consumers. Foreign pulp continues to come into the United States in large volume and these heavy supplies obviously diminish the demand for domestic pulp, so much so that a majority of American pulp manufacturers are provided with but a narrow outlet for their product excepting on contracts from regular customers.

Standard lines of domestic pulps are holding fairly steady following the gradual decline of long duration up to a short while ago. Strictly No. 1 bleached sulphite is quoted at 4 to 4.50 cents a pound f. o. b. pulp mills for bond paper quality, and 3.75 to 4 cents for book paper sulphite. Easy bleaching sulphite is quoted at 2.75 to 3 cents a pound at producing plants, and news grade sulphite at 2.50 to 2.75 cents. Domestic kraft pulp is quoted on a broad range of a low of about 2.60 cents a pound at producing mils up to 3 cents for the best grades. There are still sellers who from time to time place pulp on the market at price reductions and it is this which has an unsettling influence on values.

F. o. b. pulp mill quotations follow:

Bleached sulphite	3.75-4.50
Easy bleaching sulphite	2.75-3.00
Unbleached sulphite, No. 1	2.60-2.90
News grade sulphite	2.50-2.75
Soda pulp, bleached	3.50-3.75
Mitscherlich, unbleached	3.00-3.25
Kraft, No. 1	2.60-3.00
Screenings, refined	1.50-1.75

Mechanical Pulp

Demand for mechanical pulp is moderately active; at least consumers seem to manifest relatively greater interest than in chemical pulp, and sales mostly involve proportionately larger tonnage of ground wood than of sulphite or kraft pulps. Prices are holding fairly steady. Cold weather in grinding district has hampered grinding operations to some extent, and, according to reports, not as large stocks of ground wood are held unsold as there were a month or so ago.

Domestic manufacturers quote from $35 a ton upward f. o. b. pulp plants for prime spruce ground wood for prompt shipment. Prices range up to $40 and even higher in cases where the consuming mill is situated near to the producer and a low freight rate is involved, also depending on the air dry test. Canadian producers also quote between $35 and $40 a ton for spot shipments, and appear to be securing a fair amount of business from United States paper and board mills. Sales of imported ground wood—chiefly of Norwegian origin—at around $33 a ton ex dock New York, Baltimore and other American Atlantic ports, have been reported, which is the price generally figuring in transactions in the foreign product although importers are endeavoring to get $35 for such pulp.

Chemicals

A fairly good movement of most papermaking chemicals on contracts is in progress, and spot demand is developing in moderate volume. No broad changes are noted in prices, quotations being generally maintained with producers supplying the demand as it arises and not pressing matters. Casein is quoted at 13 to 15 cents per pound, duty paid on the imported product, and coaters are buying in a steady manner. Soda ash is quoted at 1.40 to 1.50 cents per pound at works for spot shipments, and caustic soda at 3 to 3.25 cents f. o. b. works also for spot delivery. Bleaching powder is selling at 1.50 cents a pound upward at producing plants, rosin at 5.90 to 6 cents a pound, and brimstone at $18 to $20 per ton f. o. b. mines.

Average quotations are as follows:

Alum, lump ammonia	3.25- 3.50
Alum, lump starch	3.75- 4.00
Blanc fixe, powdered	4.00- 4.25
Bleaching powder	1.50- 1.75
Brimstone (long ton, at mine)	18.00-20.00
Casein (duty paid)	13.00-15.00
Caustic soda, spot delivery	3.00- 3.25
China clay, domestic washed	12.00-15.00
China clay, foreign	15.00-20.00
Rosin, grade E	5.90- 6.00
Satin white	2.00- 2.25
Soda ash, 58 per cent light (bags)	1.40- 1.50
Starch, papermakers', in bags	3.40- 3.70
Talc (ton)	14.00-16.00

SOLVAY
STANDARD IN SODA SINCE 1881
Quality and Service Guaranteed by the Largest Source of Supply
Soda Ash
Caustic Soda
Over 75 stock distributing points assure prompt shipment with minimum transportation charges.
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SOLE SELLING AGENTS
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Unbleached Sulphite 50 tons daily
Kraft Pulp 50 tons daily
Our pulp is made from Canadian Spruce
We ship in sheets, baled
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KVP

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For wrapping all moist and greasy foodstuffs.

Bread Wraps—Waxed Papers
For tight-sealing cartons and wrapping dry foods.

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Ask and receive full information.

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Manufacturers of
PARCHMENT, WAXED and BOND PAPERS

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High Grade
Coated Book
and
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Paper

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COATED and BOOK PAPERS
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OF THE
PAPER INDUSTRY

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In addition to Officers, the following are also members of the Executive Committee:

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New Papers

Writing—	
White rag	20-45
White sulphite	11-30
Colored rag	16-40
Ledger—	
White rag	20-50
White sulphite	13-30
Colored sulphite	40-30
Colored rag	16-50
Bonds—	
White rag	19-45
White sulphite	9-30
Colored sulphite	10-30
Colored rag	18-45
Book—	
No. 1 S. & S. C.	6.25- 7.00
Machine finished	6.00- 6.75
English finished	6.25- 7.00
Coated and enameled	8.00-12.00
Lithographed, M. F.	9.00-14.00
Newsprint—	
Rolls, contract	3.75- 4.00
Rolls, transient	4.00- 4.25
Sheets	4.25- 4.50
Side runs	3.25- 3.75
Cover Stock—	
Coated, both sides	10.25
Coated, one side	10.15
Tissue—	
No. 1 white, 20x30	.75- .80
No. 2 white, 24-36	.70- .75
No. 1 manila, 24-36	.70- .75
Kraft	1.00- 1.25
Wrapping—	
No. 1 Kraft	6.00- 6.50
No. 2 Kraft	5.25- 5.50
Boards—	New York and Chicago
Solid news	50.00-55.00
Straw	55.00-60.00
Plain chip	42.50-45.00
White coated chip	65.00-70.00
Manila coated chip	60.00-65.00
Binder's board	75.00-80.00

Seeks Mill for Utilizing Bagasse

Using bagasse, the refuse pulp of cane sugar mills, Captain H. E. Ellis, a paper mill engineer and native of New York state, has, in Miami, Florida, completed a series of experiments covering a period of seven years, resulting in the production of book paper.

Ellis has also had produced, through the co-operation of several northern mills, paper made of pulp ground out of grasses which abound in south Florida. The introduction of bamboo into pulp is being sought by Captain Ellis.

A grinding mill was set up in the new refinery in Miami of the Pennsylvania Sugar company, which owns more than 100,000 acres of Everglade, or muck land, being planted in cane. Several days ago the first sugar was turned out by the plant, but the bagasse was utilized first and with success. Ellis has interested outside capital and seeks the establishment of a $350,000 pulp and paper mill, and the Curtiss-Bright Company, which has developed a suburban town near the sugar refinery, has offered a free site for the plant. Ellis was associated with Dr. Carl Kellner, of Vienna, said to be the inventor of the bisulphite process, and himself set up two plants using such process, along the Welland canal and on the St. Lawrence river.

He asserts that the sugar cane refuse is ideal for mechanical pulp for newsprint and, mixed with chemical pulp, will make any grade up to No. 1 book paper. Ellis has planted Napier grass, tested roselle hemp, sun hemp, bamboo and Neyrandia (an importation from Madagascar) which, he says, mixes successfully, if desired, with the bagasse. In using cane mill refuse, Ellis says he will add to the sheer mechanical pulp a 15 percent chemical pulp, also made of bagasse and that in the projected mill he will use a process for drying the paper invented by Ogden Minton, of South Norwalk, Conn. He states that in the chemical processes, lime and salt will be the chief ingredients substituting these for soda and chlorine.

"Materials in a green condition, such as the grasses which thrive in this sub-tropical section, are preferred because they require little chemical action and little heat, to break the fiber," said Captain Ellis to THE PAPER INDUSTRY.

"I saw several years ago that in the production of paper, especially newsprint, substitutes for wood pulp would have to be found and so I set myself to the task of trying the various grasses and bagasse.

"At first, we shall make only book paper and then, by adding one or more of the grasses, produce newsprint which can be produced for less than $60 a ton.

"With Florida and the South growing in wealth and industry and importance each year, and with the freight rates so very high from the northern mills, there seems to be abundant opportunities in Florida for paper manufacture.

"These substitutes for spruce must be found in a sub-tropical latitude without cold weather retardation."

Educational Work in Wisconsin Pulp and Paper Industry

Three seasons ago the Nekoosa-Edwards Paper Company pioneered in the work of the Wisconsin University Extension Division and started a few evening classes; but without much success. The next year they profited by what they termed their mistakes and experience with the result that of 131 men starting the work, 78 per cent finished and received diplomas.

This year, there are classes in chemical pulp and paper, also in steam and electricity at Port Edwards and Nekoosa and other mills are taking up the work. There are classes now at Mosinee among the employees of the Wausau Sulphate Fibre Co. and at Rothschild with Marathon Mill employees, also the Kimberly employees of the Kimberly-Clark Co., so that today there are about 300 paper mill workers taking University work through the Extension Division of the University of Wisconsin.

Each class has its own instructor and they meet at least once each week. Assignments are prepared at Madison and forwarded in time for the meetings each week and the questions therein must be answered in writing and returned to Madison each week for checking.

Marshall Graf of Wausau, field representative of the University of Madison and Prof. Curran of Madison has held a Kraft pulp class at Port Edwards which was attended by Nekoosa workers as well.

Prof. Curran outlined the work of the year and what is to follow and evidently the 1924-25 class will be of even greater size than the ones now being held, for in 1924 the work of the paper mill will be treated in detail and many more of the workers have expressed themselves as wanting to avail themselves of the opportunity offered to better themselves in their chosen life work.

Prof. Elliott comes up from Madison to Port Edwards each week and takes charge of the steam class, which is made up of 48 Nekoosa and Port Edwards men. In addition to the assignments and regular lectures, Prof. Elliott has many valuable stereoptican and movie films to illustrate his work which tends to make play of the more difficult problems which otherwise might be hard to solve.

Wisconsin leads in this work, as Wisconsin leads in the wrapping paper industry and Wisconsin mills as well as the consumers of Wisconsin paper products cannot help but gain by this kind of work.

Much credit should be given to E. P. Gleason, L. E. Smith, C. E. Youngchild and F. H. Rosebush for the success of the past two years at Port Edwards and Nekoosa.

The B Co. Inc. QUALITY PULPS

HAFSLUND NORWAY

"HAFSLUND BEAR"
Bleached Sulphite

F: HAGA

"FORSHAGA"
Bleached Sulphite

KRAFT HURUM NORWAY SPECIAL

"HURUM SPECIAL"
Extra Strong Kraft

KOOS BAC

"BAMBLE"
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200 FIFTH AVENUE
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FOREIGN AND DOMESTIC

PAPER MAKERS' SUPPLIES
CHEMICAL AND MECHANICAL PULPS
COTTON, JUTE AND FLAX WASTES
EAST INDIA MERCHANDISE

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A/S TOTEN CELLULOSEFABRIK
Bleached Sulphite

A/S GULSKOGEN
CELLULOSEFABRIK
Easy Bleaching
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PERKINS-GOODWIN CO.
NEW YORK
PULP and PAPER

Agents
SUND AKTIEBOLAG
Strong Unbleached Sulphite
(Indirect Cooking)

EXPORTS

The value of exports of paper from the United States in 1923 was larger than in 1922 although the quantity exported was smaller than in the preceding year, according to preliminary figures compiled and issued by the U. S. Department of Commerce. Paper exports last year totaled in value $25,677,685, which was slightly more than one and one-half million dollars in excess of exportations in 1922. Radical changes occurred last year not only in the relative importance of foreign markets, but in the comparative demand for the various kinds of paper. Owing probably to low prices quoted by European countries, a substantial decrease was noted in exports from the United States to South America, as well as in the totals of such classes of paper as newsprint, wrapping (other than Kraft), paper bags, and the cheaper grades of writing paper. These decreases, however, were more than offset by increased shipments to the Far East and by gains in book paper and Kraft shipments and exports of paper and strawboard, grease and waterproof papers, tissue and crepe papers, hanging paper and wallboard.

Newsprint exports decreased from 51,528,348 pounds, valued at $2,337,591, in 1922, to 32,714,732 pounds, for a value of $1,636,937, in 1923, but the value of book paper exports increased approximately $200,000. Exports of book paper to Mexico were valued at $232,317 in 1923, to South America $446,728, and to the Far East $600,000.

Though sales of wrapping paper (other than Kraft) in foreign markets decreased nearly 20 per cent in volume, better values brought the total value up to substantially the 1922 level. The chief losses occurred in Latin American markets, particularly in Cuba, where the total value reached only $321,741, compared with $597,738 in 1922. Exports to England, Canada and Central America, however, increased as well as to Japan and the Philippine Islands, but not sufficiently to offset entirely the decreases in other markets.

Nearly 50 per cent of the paper and strawboard exports, which increased in both quantity and value during 1923, were shipped to Canada. Notwithstanding the fact that this market received nearly 2,000,000 pounds less than in the preceding year, the total value was increased by more than $100,000. Exports to Cuba, valued at $288,510 during 1923, practically doubled the 1922 total, and a moderate advance also was indicated in the Mexican market. Excepting Colombia, the year 1923 showed a decline for this item throughout South America. Exports to China showed an important increase in quantity and advanced in value to $650,885, a gain of nearly $300,000, while shipments to Japan also increased slightly.

Exports of photographic paper in 1923 very slightly exceeded those for 1922. About 70 per cent of the total exports of boxes and cartons from the United States was absorbed by Canada, which imported 8,790,508 pounds, valued at $778,765, in 1923, an increase of 16 per cent in quantity and 33 per cent in value compared with the preceding year.

A decline of 16 per cent in quantity and 9 per cent in value occurred in exports of writing paper for the year.

IMPORTS

Wood Pulp

A firmer undertone seems developing in foreign wood pulp. As a matter of fact prices have steadied to a pronounced degree at primary sources, and buyers are having less success in securing supplies at below the rates quoted by importers since manufacturers abroad are apparently in a stronger position and are more insistent on receiving certain minimum rates for their pulp. Reports from Sweden tell of a firmer market condition in that country. Manufacturers of sulphate pulp in Sweden have reorganized their trade association and have decided on 2.50 cents per pound as a minimum price of No. 1 Kraft pulp, and this is about the bottom quotation named at present by importers in New York, with some quoting in excess of this figure.

It is also reported that Swedish producers are well sold up on pulp. British papermakers are said to be buying freely in Sweden and to have contracted for supplies for some time ahead, and demand is encountered from other European countries, the reports stating that even Germany is now purchasing some Swedish pulp after having been out of that market for a lengthy period.

It would appear that the main bearish factor in the situation at present is that there are fairly large unsold stocks of foreign pulp owned by importers, or by producers shipped into the United States on consignment. Spot stocks on the Atlantic seaboard are variously estimated, but conservative members of the trade place total holdings at fully 50,000 tons. Obviously there are some who have pulp who are desirous of liquidating, and occasionally "distress" sales are recorded at prices which are not truly representative of the market, yet nevertheless establish market values of pulp. It is this which is having an unsettling influence on prices, despite the firming position of pulp at primary quarters abroad, and notwithstanding that American paper mills are purchasing in somewhat better volume than they were.

Importations keep up to a high level. As an indication, a steamer arrived at New York a few days ago from Christiania carrying more than 20,000 bales of pulp in her cargo. Latest Government statistics show that in December total imports into the United States amounted to 87,173 net tons of chemical and 31,633 tons of mechanical pulp, compared with 76,441 tons of chemical and 27,380 tons of mechanical imported in November last, and 81,520 tons of chemical and 23,469 tons of mechanical received in October.

Imports of sulphite-bleached and unbleached—into the U. S. in 1923 totaled 712,393 tons, valued at $48,791,977, which amount was far above the total of 1922, when 635,793 tons, for a value of $40,293,684, were imported, and probably established a new high record of sulphite importations into this country. Imports of sulphate pulp last year totaled 233,503 tons, valued at $15,204,012, against 275,504 tons, for a value of $16,085,121, in 1922. Imports of mechanical pulp for the year were 267,527 tons, valued at $9,280,863, compared with 192,688 tons, for a value of $5,706,529, imported in 1922.

Bleached sulphite is quoted on a range of 3.75 to 4.25 cents per pound ex dock New York for No. 1 grade, and unbleached of strong quality at about 2.60 to 2.65 cents on the dock in a majority of cases. Easy bleaching sulphite is quoted at 2.75 to 3 cents ex dock, while Scandinavian Kraft is held at 2.50 cents per pound upward ex dock, some importers asking 2.60 cents and even higher for Kraft. Foreign ground wood is selling on the spot in New York at $33 to $35 a ton ex dock.

Receipts at the port of New York in February and current market quotations ex dock New York follow:

Bleached sulphite, No. 1	$ 3.75- 4.25
Unbleached sulphite, No. 1	2.60- 2.90
Easy bleaching	2.75- 3.00
Mitscherlich unbleached	2.80- 3.00
Kraft	2.50- 2.75
Ground wood, per ton	33.00-35.00

Lagerloef Trading Co., 842 bls. from Helsingfors; Pagel, Horton & Co., 7,000 bls. from Gavle; Bulkley, Dunton & Co., 4,925 bls. from Gavle and 2,000 bls. from Christiania; Scandinavian Pulp Agency, 500 bls. from Gavle and 762 bls. from Gothenburg; Johaneson, Wales & Sparre, 2,250 bls. from Sundsvall; American Woodpulp Corp., 2,750 bls. from Sundsvall; A. J. Bracher & Co., 398 bls. from Hamburg; J. Andersen & Co., 1,800 bls. from Christiania and 600 bls. from Harnosand; R. F. Hammond, Inc., 2,400 bls. from Sundsvall and 1,500 bls. from Christiania; E. M. Sergeant Co., 2,550 bls. from Harnosand and 125 bls. from Christiania; Castle & Overton, 62 bls. from Bremen and 600 bls. from Gothenburg; E. Naumberg & Co., 300 bls. from Trieste; Parsons & Whittemore, 500 bls. from Gothenburg; Nilsen, Lyon & Co., 2 bls. from Gothenburg and 2,300 bls. from Christiania; H. Hollesen, Inc., 2,000 bls. from Bremen; E. Butterworth & Co., 180 bls. from Christiania; Guaranty

SULPHATE OF ALUMINA
MANUFACTURED BY
THE JARECKI CHEMICAL CO.

SODA ASH 58%
MANUFACTURED BY
PITTSBURGH PLATE GLASS CO.
COLUMBIA CHEMICAL DIVISION

The Isaac Winkler & Bro. Co.
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J. ANDERSEN & CO.
21 East 40th Street, New York City

Importers of Chemical Pulps
BLEACHED AND UNBLEACHED

Agents for Kellner Partington Paper Pulp Co., Ltd.
Sarpsborg, Norway; Forshaga, and Edsvalla, Sweden

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DEALERS IN DOMESTIC CHEMICAL AND MECHANICAL PULPS AND PAPER

AGENTS FOR
J. & J. Rogers Company, Ausable Forks, N. Y.
E. B. Eddy Company, Ltd., Hull, Canada

Canadian Kraft Limited, Three Rivers, Canada
Dealers in Wayagamack Kraft Pulp

Howard Smith Paper Mills, Montreal, Quebec
EASTERN AGENTS of Sulphite Pulp. Made by
Port Huron Sulphite & Paper Co., Port Huron, Mich.

Quality Guaranteed

The Smallwood-Low Stone Co.
Lisbon, Ohio
U. S. A.

SOUTHWARK HYDRAULIC EQUIPMENT for PULP and PAPER MILLS

The Southwark Pulp Presses and Trucks illustrated at the right are typical of many efficient installations of Southwark Equipment in actual service in paper mills throughout the United States and Canada. In addition to standard dehydrating presses for pulp, sulphite, etc., we specialize in the design and construction of machinery to suit the manufacturers' requirements.

We carry a complete line of Hydraulic Accumulators, Pumps, Valves, Fittings, Shock Absorbers, etc.

SOUTHWARK FOUNDRY & MACHINE CO.
PHILADELPHIA, PA.
CHICAGO FISHER BUILDING CLEVELAND SWETLAND BUILDING

Three 600 Ton Southwark Pulp Presses and Trucks at the Timiskaming Pulp and Paper Company, Haileybury, Ontario, Canada.

Trust Co., 8,035 bls. from Drammen and 4,934 bls. from Larvik; Mechanics & Metals National Bank, 1,000 bls. from Christiania; Central Union Trust Co., 500 bls. from Christiania; Perkins-Goodwin Co., 125 bls. from Christiania; New York Trust Co., 12,500 bls. from Christiania; Acer & Co., 9,375 bls. from Vancouver; Order, 500 bls. from Hamburg, 2,656 bls. from Bremen, 4,525 bls. from Danzig, 135 bls. from Helsingfors and 1,275 bls. from Larvik.

Paper Stock

The outstanding feature in the foreign trade of the United States in papermaking materials during February was the large importation of rag stock. Rags were received in unusually heavy amounts, and, judging from the arrivals through the port of New York, close to a record total was imported during the month. Receipts of other materials were fairly large.

Government figures show that a total of 397,711,699 pounds of papermaking rags was imported into the U. S. in 1923, valued at $7,153,469, which constituted a record of imports of this commodity, and compared with 301,898,340 pounds, for a value of $4,705,422, imported in 1922. Imports of old rope, bagging, waste paper and other paper stock last year totaled 233,154,855 pounds, valued at $6,606,587, against imports of 201,311,393 pounds, for a value of $4,679,723, in 1922.

Imports of all kinds of papermaking material at the port of New York in February, with names of consignees, follow:

Old Rope

Brown Bros. & Co., 458 coils from Bristol, 93 coils from Copenhagen, 78 coils and 132 bls. from Antwerp, 235 coils from Marseilles, 83 coils from Newcastle, 248 coils and 6 bls. from Hull and 99 coils from Rotterdam; International Purchasing Co., 36 bls. from Havre; Ellerman-Wilson SS. Line, 154 coils and 137 bls. from London and 57 coils and 17 bls. from Hull; Maurice O'Meara Co., 215 bls. from Genoa; Italian Discount & Trust Co., 114 bls. from Leghorn; Bank of New York & Trust Co., 116 coils from Copenhagen; Guaranty Trust Co., 115 bls. from Antwerp; International Acceptance Bank, 49 bls. from Genoa; N. E. Berzen, 9 bls. from Havana; Goldman, Sachs & Co., 230 coils and 120 bls. from Copenhagen; Order, 43 coils from Rotterdam.

Old Bagging

Equitable Trust Co., 57 bls. from Antwerp; Kidder-Peabody Acceptance Corp., 120 bls. from Havre; C. R. Spence & Co., 158 bls. from Dublin; Leshner Paper Stock Co., 198 bls. from Havre; E. Butterworth & Co., 174 bls. from Rotterdam; Goldman, Sachs & Co., 211 bls. from Copenhagen.

Rags

E. J. Keller Co., 138 bls. from Hamburg, 64 bls. from Bordeaux, 914 bls. from Copenhagen, 202 bls. from Havre, 430 bls. from Bremen and 1,204 bls. from Rotterdam; F. P. Gaskell & Co., 112 bls. from London; Leshner Paper Stock Co., 52 bls. from Rotterdam and 22 bls. from Antwerp; American Woodpulp Corp., 89 bls. from Rotterdam; M. Wolfer & Co., 52 bls. from Havana; M. M. Atterbury, 108 bls. from St. Nazaire; Castle & Overton, 76 bls. from Dunkirk; Brown Bros. & Co., 111 bls. from Glasgow, 395 bls. from Antwerp and 657 bls. from Alexandria; W. Schall & Co., 161 bls. from Antwerp; Rudolf Wolf, 61 bls. from Venice; Waste Material Trading Corp., 261 bls. from Marseilles; Albion Trading Co., 27 bls. from Liverpool; G. P. Lotterhand, 6 bls. from Liverpool; Draycott Mills, 44 bls. from Leith; A. W. Fenton, Inc., 437 bls. from Rotterdam; E. Jonofski, 24 bls. from Havana; Union National Bank, 112 bls. from Venice and 263 bls. from Hamburg; Mechanics & Metals National Bank, 32 bls. from Venice, 60 bls. from Marseilles and 79 bls. from Hamburg; Coal & Iron National Bank, 468 bls. from Dublin, 81 bls. from Havre and 56 bls. from Glasgow; American Exchange National Bank, 199 bls. from Hamburg; Irving Bank-Columbia Trust Co., 75 bls. from London and 145 bls. from Antwerp; Chase National Bank, 93 bls. from Leith, 73 bls. from Havre and 125 bls. from London; Guaranty Trust Co., 186 bls. from Bristol, 27 bls. from London, 23 bls. from Hamburg, 505 bls. from Manchester and 408 bls. from Havre; National City Bank, 580 bls. from Antwerp; International Acceptance Bank, 84 bls. from Antwerp and 171 bls. from Bremen; New York Trust Co., 39 bls. from Marseilles and 40 bls. from Havre; Bank of New York & Trust Co., 83 bls. from Barcelona; E. W. Dutton, Inc., 71 bls. from Havre and 44 bls. from Manchester; American Express Co., 48 bls. from Glasgow; State Bank, 222 bls. from Leith; Equitable Trust Co., 26 bls. from Hamburg and 92 bls. from Manchester; Chemical National Bank, 73 bls. from Havre and 222 bls.

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from Bremen; First National Bank of Boston, 105 bls. from Havre; Philadelphia National Bank, 80 bls. from Newcastle; Second National Bank of Boston, 231 bls. from Bristol; Strupp & Co., 108 bls. from Hamburg; Kidder-Peabody Acceptance Corp., 48 bls. from Havre; Order, 324 bls. from London, 187 bls. from Havre, 438 bls. from Antwerp, 747 bls. from Liverpool, 214 bls. from Hamburg, 68 bls. from Alexandria, 175 bls. from Glasgow and 192 bls. from Bristol.

Miscellaneous Paper Stock

International Acceptance Bank, 83 bls. from Antwerp and 67 bls. from Leith; Equitable Trust Co., 205 bls. from Antwerp and 72 bls. from Liverpool; E. J. Keller Co., 56 bls. from Antwerp; New York Trust Co., 184 bls. from London; Mechanics & Metals National Bank, 37 bls. from Bremen; Guaranty Trust Co., 48 bls. from Genoa, 80 bls. from Dundee and 252 bls. from Leith; Maurice O'Meara Co., 55 bls. from Belfast; Brown Bros. & Co., 193 bls. from Dublin and 177 bls. from Bristol; W. Schall & Co., 50 bls. from Antwerp; Merchants' National Bank, 16 bls. from Antwerp; Order, 20 bls. from Liverpool, 170 bls. from Leghorn, 134 bls. from Palermo and 191 bls. from Leith.

Paper

Importations of paper into the United States in February were of fair volume and marked by no feature, judging from the receipts through the port of New York. There were some large shipments of Kraft wrapping, but imports of this class of paper for the month were smaller than in recent months. Usual amounts of print paper, cigarette, hanging, filter and other grades were imported. Receipts of paper of all kinds through the port of New York in February follow:

Cigarette

American Tobacco Co., 800 cs.; R. J. Reynolds Tobacco Co., 770 cs.; Torro Tobacco Co., 12 cs.; DeManduit Paper Corp., 182 cs.; Standard Products Corp., 296 cs.; Surbrug Co., 23 cs.; P. J. Schweitzer, 79 cs.; J. V. Lago, 4 cs.; M. Spiegel & Sons, 14 bls.

Printing

Falsing Paper Co., 52 cs.; Guaranty Trust Co., 112 rolls; F. O. Nelson, Inc., 326 rolls; Kupfer Bros. Co., 12 cs.; Steffens Sons & Co., 31 cs.; Perry, Ryer & Co., 67 cs.; C. Steiner, 44 cs.; Parsons & Whittemore, 1,335 rolls; Equitable Trust Co., 533 rolls; Perkins-Goodwin Co., 69 rolls and 90 cs.; Chemical National Bank, 963 rolls; American Exchange National Bank, 82 rolls; E. Naumberg & Co., 531 rolls; Oxford University Press, 10 cs.; B. F. Drakenfeld & Co., 65 cs.; P. C. Zuhlke, 315 cs.; P. Puttmann, 12 cs.; International Acceptance Bank, 1,509 rolls; Traders' Paper Co., 75 cs.; Bowater Paper Co., 78 rolls; Young Publishing Co., 180 rolls; New York & Hauseatic Corp., 133 rolls; W. Hartmann & Co., 642 rolls; Redden & Martin, 32 rolls; Fourth & First National Bank of Nashville, 96 rolls; Order, 1,750 rolls.

Wrapping

Irving Bank-Columbia Trust Co., 1,454 bls.; Wilkinson Bros. & Co., 367 rolls and 258 bls.; Maurice O'Meara Co., 661 rolls; Republic Bag & Paper Co., 551 bls.; J. P. Heffernan Paper Co., 1,436 bls.; C. Steiner, 55 bls.; W. Hartmann & Co., 1,252 rolls and 113 bls.; Corn Exchange National Bank, 45 bls.; C. K. MacAlpine & Co., 97 rolls and 55 bls.; American Express Co., 2,146 rolls; National City Bank, 20 rolls and 153 bls.; D. S. Walton & Co., 1,153 rolls and 262 bls.; Arkell Safety Bag Co., 32 bls.; U. S. Steel Products Co., 37 rolls; Dupont Cellophane Co., 18 cs.; Whiting-Patterson Co., 39 rolls; Borregaard Co., 2,833 rolls and 179 bls.; Blauvelt-Wiley Paper Mfg. Co., 96 bls.; Cellopap Paper Co., 214 bls.; Steffen, Johns & Co., 31 bls.; Royal Mail Steam Packet Co., 52 bls.; American and Cuban SS. Line, 190 bls.; International Acceptance Bank, 557 rolls and 638 bls.; Gallagher & Ascher, 115 bls.; C. G. Keferstein, 151 rolls; W. Schall & Co., 5,717 rolls and 29 bls.; Chase National Bank, 646 rolls; Seantis, Inc., 5 bls.; Order, 1,762 rolls and 318 bls.

Writing

Thomas & Pierson, 2 cs.; K. Pauli Corp., 9 cs.; Defiance Sales Corp., 5 cs.; Guibont, Freres & Co., 13 cs.

Drawing

Globe Shipping Co., 7 cs.; E. Dietzgen & Co., 62 cs.; Keuffel & Esser Co., 44 cs. and 57 rolls; Devoe & Reynolds Co., 3 cs.; H. Reeve Angel & Co., 3 cs.

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Tissue

F. C. Strype, 34 cs.; J. B. Mast, 4 cs.; W. J. Brynes & Co., 2 cs.; Pitts & Scott, 46 cs.

Photo

Glove Shipping Co., 83 cs.; Gevaert Co. of America, 8 cs.

Hanging

A. C. Dodman, Jr., & Co., 40 cs. and 49 bls.; F. J. Emmerich & Co., 104 bls.; W. H. S. Lloyd & Co., 159 bls.; Bernard, Judae & Co., 14 bls.; F. G. Prager & Co., 1,079 rolls and 6 cs.; R. F. Downing & Co., 39 bls. and 11 cs.; National City Bank, 1,420 bls.

Board

O. G. Hempstead & Sons, 23 cs.; Scientific Materials Co., 7 cs.; Flexideal Co., 90 cs.; Bendix Paper Co., 6 cs.; H. Bourjois, 9 cs.; Happel & McAvoy, 25 cs.; Friedman & Co., 5 cs.; Metropolitan Import & Mfg. Co., 47 cs.; Maurice O'Meara Co., 6 bls.; Park & Tilford, 4 cs.; A. Vuyck, 200 pkgs.; New York Label & Box Works, 9 cs.; F. G. Prager & Co., 3 rolls; Order, 51 cs.

Miscellaneous

A. Frankan & Co., 7 cs.; Martin, Bechtold & Co., 26 cs.; C. W. Williams & Co., 27 cs.; Borden & Riley Paper Co., 24 cs.; Louis Dejonge & Co., 8 cs.; Whiting-Patterson Co., 55 cs.; Guibont, Freres & Co., 9 cs.; Birn & Wachenheim, 19 bls.; Gallagher & Ascher, 2 cs.; Independent Forwarding Co., 11 cs.; Hensel, Bruckman & Lornbacher, 12 cs.; G. W. Sheldon & Co., 3 cs.; Quality Art Novelty Co., 18 cs.; C. H. Boulin, 36 cs.; B. C. Ritchie, 25 cs.; C. B. Richard & Co., 11 cs.; Coenca-Morrison Co., 13 cs.; Morrison Machine Co., 21 cs.; J. & H. Berge, 4 cs.; Meadows, Wye & Co., 8 cs.; Miller & Wright Paper Co., 8 cs.; Ault & Wiborg, 20 cs.; H. C. Davison & Co., 11 cs.

Foreign Trade Opportunities

Additional information regarding the following foreign trade opportunities issued by the Bureau of Foreign and Domestic Commerce of the United States Department of Commerce may be obtained from the Bureau in Washington, D. C., or its branch offices. It is requested that the number of the inquiry be given at all times.

No. 9015—Cartons, paper, nonleakable, and machinery for manufacture of same. Johannesburg, South Africa. Purchase and agency desired.

No. 9027—Paper, stationery, printers' supplies and printing machinery. Johannesburg, South Africa. Purchase and agency desired.

No. 9110—Paper, wrapping, packing, newsprint, letter and adhesive. Constantinople, Turkey. Purchase desired.

No. 9092—Paper and stationery, cardboard and strawboard. Rajkot, India. Purchase desired.

No. 9117—Caustic soda and soda ash. Amritsar, India. Purchase and agency desired.

No. 9124—Caustic soda, 50 to 100 tons monthly. Frankfort, Germany. Purchase desired.

No. 9171—Building board, fiber. Puerto Cortes, Honduras. Purchase desired.

No. 9150—Paper. Santo Domingo, Dominican Republic. Agency desired.

No. 9159—Paper, such as newsprint, kraft, transparent, bond, check, legal and writing. Shanghai, China. Purchase desired.

No. 9184—Paper, printing, writing, bank post, packing, etc. Bombay, India. Purchase and agency desired.

No. 9164—Wall paper. Santiago, Cuba. Exclusive agency desired.

Old Hickory Paper Co. to Build Kraft Mill

Plans have been perfected for the building of a two-machine Kraft paper mill at Old Hickory, Tenn. The pulp mill is already completed and has a capacity of 150 tons per day. The paper mill will be equipped with two large high-speed 184" Beloit Fourdrinier machines, each capable of producing 75 tons of Kraft paper per day.

The pulp mill was built by the old Nashville Pulp and Paper Company, which has been reorganized and refinanced and provided with adequate capital. The new company will be known as Old Hickory Paper Company, Old Hickory, Tenn., John I. Beggs, of Milwaukee, president, and R. J. Cullen, vice-president and manager. Mr. Beggs is prominently identified

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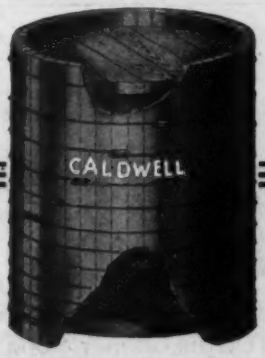

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with large banking institutions and also with large public utility interests, while Mr. Cullen is well known throughout the trade as a very capable and successful paper mill executive, having many years' experience in building and operating Kraft paper mills, one of his most recent achievements being the construction and starting up of the now famous Bastrop, La., mill of the Bastrop Pulp and Paper Company.

Contracts have already been awarded to the Beloit Iron Works for these large high-speed papermaking machines, embodying all the latest improvements, such as their removable Fourdrinier, their rope drive and many other important features. Orders have also been placed for beaters, Jordons and power equipment. Contract has been awarded for the steel for the paper mill buildings. A construction force has already been organized and started work clearing off the site and preparing for the rapid construction of the new paper mill. The first unit is expected to be ready for production in the fall of 1924.

It is understood that this new mill will be ideally located with respect to the Kraft markets, and will enjoy an abundant supply of suitable pulpwood and good water.

The officers of this new new mill have determined to make this the finest Kraft mill in the South, and it will be equipped with all the latest labor-saving devices, which will contribute to a low cost of paper. The building will be of re-enforced concrete and brick, and nothing will be spared to produce a thoroughly high-class modern Kraft paper mill.

Dayton Convention Paper Mill Superintendents

Great preparations are being made by the general committee in charge of the Dayton (Ohio) annual convention of the National Association of Pulp and Paper Mill Superintendents set for three days, May 22, 23 and 24.

The general committee is composed of: Chairman, H. W. Server; Arrangements, F. H. Henry; Reception, John J. Maloney; Resolutions, B. T. McBain; Registration, H. D. Martindale; Transportation, Thos. E. Keogh; Visitation, Tom Harvey.

The American Paper and Pulp Mill Superintendents' Association is an Associate member of the American Paper and Pulp Association. Mr. Nelson R. Davis, superintendent of S. D. Warren Co., Cumberland Mills, Maine, is the president, while Peter J. Massey of Chicago is secretary-treasurer.

A very instructive program has been arranged for including papers by:

Howard S. Taylor of Dayton, Ohio, president of the Technical Association of the Pulp and Paper Industry and a general paper mill engineer of that city.

B. S. Summers of Port Huron, Michigan, a chemical engineer of high standing and for years making a specialty of papermaking fibers for various purposes.

C. L. Cecil, a forest engineer, of Duluth, Minnesota, will show the superintendents where they must look for their future supply of raw material, if there is to be any supply at all.

E. P. Gleason, general engineer of the Nekoosa-Edwards Paper Company of Port Edwards, Wisconsin, will read a paper on paper drying, the one big subject now before the paper industry next to wood supply and waste.

Geo. P. Hambrecht, U. S. Director of Vocational Education, will talk to the convention on his wonderful work for labor among those who have not been able to get all the education they want.

There will be many other subjects taken up, among them the report of the General Standards Committee of Fifteen for Sulphite, Sulphate, Soda and Groundwood Pulps and a Kraft Pulp and Paper discourse by B. T. McBain, general superintendent and assistant general manager of the Nepco Mills at Port Edwards, Wisconsin.

The mills in Ohio district will have open house for the visitors and it is expected at least 50 per cent of the membership of some 1,000 will be present.

Plans are being made for the early erection of several one-story structures by the Florida Paper Mills Company, of Jacksonville, Fla., a subsidiary of the Grass Fibre Pulp and Paper Company, of Leesburg, Fla. The new mill will cost in excess of $250,000, and bids are being asked for the building of the initial units.

The first National Chemical Equipment Exposition will be held in the State Armory, Providence, R. I., June 22d to 27th, inclusive, 1925, under the management of the Chemical Equipment Association and in conjunction with a regular four-day meeting of the American Institute of Chemical Engineers.

"Pulpwood and Wood Pulp in North America"

By ROYAL S. KELLOGG

An interesting and thorough description of the pulpwood industry—processes of making paper pulp from wood—the timber supply of North America—the need for increased timber production and future possibilities of the pulp and paper industry.

Detailed statistics of production and consumption since the establishment of the industry are given in the appendix and shown in the text by means of graphic charts of unusual effectiveness.

This book is of special interest to everyone connected with the pulp and paper industry. It points out clearly what must be done to develop sufficiently our supply of pulpwoods. It shows the steps necessary in forest conservation and discusses the subject from the practical viewpoint of industrial needs. 270 pages, 6x9; 87 illustrations.

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Effect of Atmospheric Humidity on Paper Tests: P. L. Houston and H. S. Kirkwood.

Efficiency of Paper Drying: S. B. Jones and W. F. Goldsmith.

Evaporation of Spent Liquors: G. K. Spence.

Lake Color Manufacture: H. H. Holden.

Methods of Establishing Wage Rates and Determining Promotions: H. P. Carruth.

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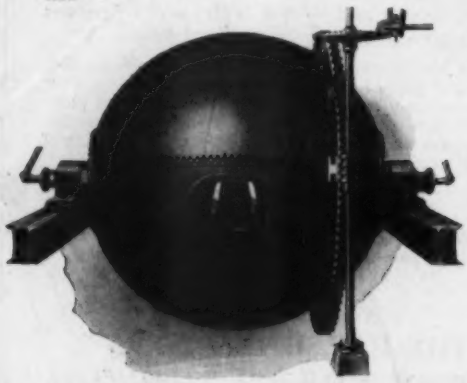

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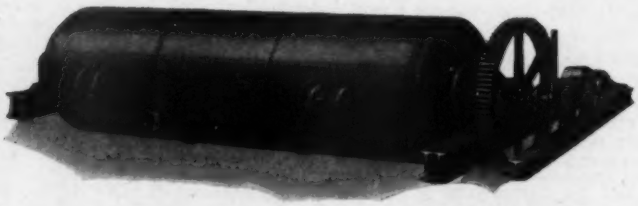

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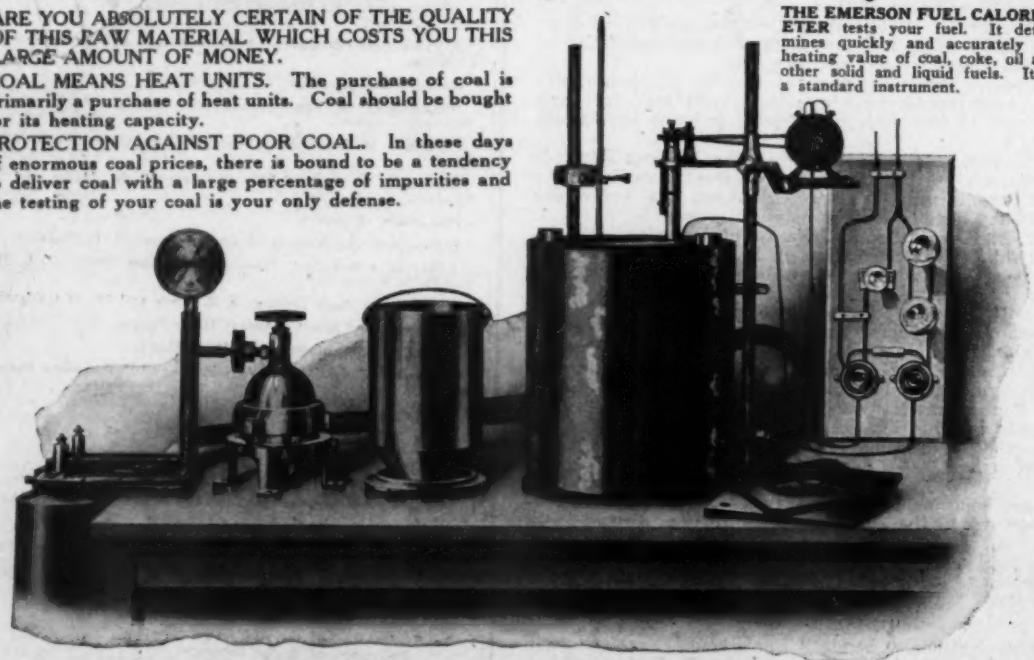

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Manitowoc Eng. Works.

BEARINGS
The Falls Clutch & M. Co.
The Hill Clutch Co.
The Webster Mfg. Co.
T. B. Wood's Sons Co.

BEARINGS (Babbitt)
Joseph T. Ryerson & Son, Inc.

BEARINGS (Ball)
S. K. F. Industries.

BEATERS (Continuous)
The Hermann Mfg. Co.
The Shartle Bros. Machine Co.

BEATER ROLL RAISER
Griley-Unkle Engineering Co.

BEATING, WASHING AND BLEACHING ENGINES
Dayton Beater & Hoist Co.
Dayton Globe Iron Wks.
Noble & Wood Machine Co.
Valley Iron Works Co.

BELT DRESSING
Chicago Belting Co.

BELT DRIVES
The Falls Clutch & M. Co.
Hill Clutch Co.
The Jeffrey Mfg. Co.
The Link Belt Co.
Morse Chain Co.
T. B. Wood's Sons Co.

BELT FASTENERS
Crescent Belt Fastener Co.

BELT LACING
Chicago Belting Co.
Flexible Steel Lacing Co.
Schieren Co., Chas. A.

BELTING (Leather)
Chicago Belting Co.
J. E. Rhoads & Sons
Schieren Co., Chas. A.

BELTING (Rubber)
Empire Tire & Rubber Corp.
B. F. Goodrich Rubber Co.
The Republic Rubber Co.
Voorhees Rubber Belt Co.

BELTING (Silent Chain)
Link Belt Co.
Morse Chain Co.

BLEACHING BOILERS
The Biggs Boiler Works Co.
Manitowoc Eng. Works.

BLEACHING POWDER
The Mathieson Alkali Wks.
Pennsylvania Salt Mfg. Co.

BLEACHING (Propellers)
Moore and White Co.

BLOWERS
American Blower Co.
Bayley Mfg. Co.
Ingersoll-Rand Co.
The Jeffrey Mfg. Co.
J. O. Ross Eng. Corp.
Sturtevant Co., B. F.

BLOW-OFF VALVES
The Appleton Machine Co.
The Lunkenheimer Co.

BOARD MACHINES
Beloit Iron Works.
Black-Clawson Co.
Valley Iron Works.

BOILERS
Manitowoc Eng. Works.

BOILER TUBES & FITTINGS
Joseph T. Ryerson & Son, Inc.
The Lunkenheimer Co.

BRASS WIRE CLOTH
Appleton Wire Works.
Cabble Excelsior Wire Mfg. Co.,
The Wm.
Cheney Bigelow Wire Works.
Eastwood Wire Mfg. Co.
Lindsay Wire Weaving Co.
W. S. Tyler Co.

BRICK (Fire)
Elk Fire Brick Co. of Canada, Ltd.

BRIMSTONE
Union Sulphur Co.

BRONZE CASTINGS
Eastwood Wire Mfg. Co.

BRUSHES
Stewart-Adams & Co.

BUCKETS (Elevator)
Hendricks Mfg. Co.
The Jeffrey Mfg. Co.
Robins Conveying Belt Co.
The Union Chain & Mfg. Co.
The Webster Mfg. Co.
Weller Mfg. Co.

BUCKETS (Clamshell)
Industrial Works.

BURRS
F. W. Roberts Mfg. Co.

CALENDERS
Beloit Iron Works.
Norwood Eng. Co.
Smith & Winchester Mfg. Co.

CALENDER DOCTORS
Beloit Iron Works.
Ticonderoga Machine Works.

CAR PULLERS
Stephens-Adamson Mfg. Co.

CASEIN
Casein Mfg. Co.

CASTINGS (Brass)
The Appleton Machine Co.
Eastwood Wire Mfg. Co.
Smith & Winchester Mfg. Co.

CASTINGS (Grey Iron)
The Appleton Machine Co.
Hill Clutch Co.
Nordberg Mfg. Co.
Robins Conveying Belt Co.
The Webster Mfg. Co.

CASTINGS (Iron)
Poole Eng. & Mach. Co.
Smith & Winchester Mfg. Co.

CASTINGS (Steel & Semi-Steel)
Poole Eng. & Mach. Co.

CAUSTIC SODA
Diamond Alkali Co.
Michigan Alkali Co.
The Mathieson Alkali Wks.
Solvay Process Co.

CHAINS
The Jeffrey Mfg. Co.
Robert L. Latimer & Co.
The Union Chain & Mfg. Co.

CHAINS (Barking Drum)
The Union Chain Mfg. Co.

CHAIN DRIVES
The Jeffrey Mfg. Co.
Link Belt Co.
Morse Chain Co.
The Union Chain & Mfg. Co.
Weller Mfg. Co.

CHEMICALS
Diamond Alkali Co.
The Mathieson Alkali Wks.
Merrimac Chemical Co.
Solvay Process Co.

CHIPPERS
The Appleton Machine Co.
Union Iron Works.
Valley Iron Works Co.

CLAYS AND FILLERS
Daniel M. Hicks.
United Clay Mines Corp.

CLAY MIXERS
Manitowoc Eng. Works.

CHLORINE (Liquid)
Mathieson Alkali Wks., Inc.

COAL BUNKERS
The Brown Hoisting Mach. Co.
Hendrick Mfg. Co.

COAL & ASH HANDLING SYSTEMS
The Brown Hoisting Mach. Co.
Godfrey Conveyor Co.
Industrial Works.
The Jeffrey Mfg. Co.
Link Belt Co.
Louden Mach. Co.
The Webster Mfg. Co.
Weller Mfg. Co.

COATED PAPERS
Watervliet Paper Co.

CONCRETE REINFORCING STEEL
Joseph T. Ryerson & Son, Inc.

CONDENSERS
Ingersoll-Rand Co.
Nordberg Mfg. Co.

CONSULTING ENGINEERS
James L. Carey.
Hardy S. Ferguson.
Ferguson Engineers.
George F. Hardy.
V. D. Simons.
Jos. H. Wallace & Co.

CONSULTING ENGINEERS (Power)
Ferguson Engineers.
V. D. Simons.

CONTAINER MACHINES
The Drake Process, Inc.

CONTRACTORS (Building)
The Austin Co.

CONVEYORS
The Brown Hoisting Mach. Co.
Godfrey Conveyor Co.
The Jeffrey Mfg. Co.
Robert L. Latimer & Co.
Link Belt Co.
Louden Mach. Co.
Union Chain & Mfg. Co.
The Webster Mfg. Co.
Weller Mfg. Co.

CONVEYORS (Belt)
The Jeffrey Mfg. Co.
Robins Conveying Belt Co.
Voorhees Rubber Mfg. Co.

CORDUROY WIRE CLOTH
The W. S. Tyler Co.

CORES (Collapsible)
Smith & Winchester Mfg. Co.

CORLISS ENGINES
Nordberg Mfg. Co.

CORRUGATED STEEL SHEETS
Joseph T. Ryerson & Son, Inc.

COUPLINGS
The Falls Clutch & M. Co.
Hill Clutch Co.
Standard Pressed Steel Co.

COUPLINGS (Shaft)
Hill Clutch Co.
T. B. Wood's Sons Co.

CRANES (Crawling Tractor)
The Brown Hoisting Mach. Co.
Industrial Works.

CRANES (Dipper Arm)
Industrial Works.
Orton & Steinbrenner Co.

CRANES (Locomotive)
The Brown Hoisting Mach. Co.
The Browning Co.
Link Belt Co.
Industrial Works.

CRANES (Overhead Traveling)
Louden Mach. Co.
New Jersey Foundry & Machine Co.
Northern Engineering Works.

CREOSOTING CYLINDERS
Biggs Boiler Works Co.

CRUSHERS (Coal and Coke)
The Jeffrey Mfg. Co.
Orton & Steinbrenner Co.
Robins Conveying Belt Co.
The Webster Mfg. Co.
Weller Mfg. Co.

CUTTERS
Beloit Iron Works.
Smith & Winchester Mfg. Co.

CYLINDER MACHINES
Beloit Iron Works.
The Shartle Bros. Machine Co.
Smith & Winchester Mfg. Co.

CYLINDER MOLDS (New or Repaired)
Appleton Wire Works
Beloit Iron Works.
Cheney Bigelow Wire Works.
Eastwood Wire Mfg. Co.
Glens Falls Machine Works.
The Lindsay Wire Weaving Co.
The W. S. Tyler Co.

DANDY ROLLS
Appleton Wire Works.
Central Mfg. Co.
Cheney Bigelow Wire Works.
Eastwood Wire Mfg. Co.
Lindsay Wire Weaving Co.
The W. S. Tyler Co.

DIE PRESSES
Smith & Winchester Mfg. Co.

DIESEL ENGINES
Nordberg Mfg. Co.

DIFFUSERS
Manitowoc Eng. Works.

DIGESTERS
The Biggs Boiler Works Co.
Hendrick Mfg. Co.
Manitowoc Eng. Works.
Old Hickory Powder Plant.

DIGESTER COVERS
Eastwood Wire Mfg. Co.

DIGESTER LININGS
Stebbins Engineering & Mfg. Co.

DRAINAGE SYSTEMS
The Fulton Engineering Co.

DRUM WINDERS (Drives)
Beloit Iron Works.
Ticonderoga Machine Co.

DRYERS
Beloit Iron Works.
Hendrick Mfg. Co.
Smith & Winchester Mfg. Co.
Sturtevant Co., B. F.

DRYERS (Rotary)
Biggs Boiler Works Co.
Hendricks Mfg. Co.
Sturtevant Co., B. F.

DRYER EXHAUST
Nash Engineering Co.

DRYER FELTS
Appleton Woolen Co.
Fitchburg Duck Mills.
F. C. Huyck & Sons.
Lockport Felt Co.
Shuler and Benninghofen.

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at the RICHARDSON COMPANY

Water or No Pay

What wouldn't it mean to your plant to have a plentiful supply of pure well water—pumped from scientifically constructed Layne Gravel Wall Wells by the Layne Vertical turbine pumps into surface reservoirs, elevated tanks, or directly into the mains.

So efficient is this method of procuring a water supply that hundreds of industrial plants are saving thousands of dollars a year by adopting the Layne System.

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to know our water supply contracts are made on a guaranteed basis. You either obtain the amount of water agreed upon, or it does not cost you a cent. Water or No Pay.

Our associate companies have been organized to give you prompt and efficient engineering services; write to the one nearest you.

LAYNE & BOWLER CO., Memphis, Tenn.

FACTORIES: MEMPHIS, TENN.; LOS ANGELES, CAL.; HOUSTON, TEXAS

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Layne & Bowler Chicago Co., 860 Old Colony Building., Chicago, Ill.
Layne Arkansas Co., Stuttgart, Ark.
Layne Ohio Co., Wyoming Station, Cincinnati, Ohio
Layne Southeastern Co., 1st Nat'l Bk. Bldg., St. Petersburg, Fla.
Layne Central Co., Memphis, Tenn.
Branch Office, Crowley, La.

The Hidden Costs of Paper Production

The most expert Efficiency Engineer in the World would find it difficult to gauge accurately the actual loss occasioned by the stretching, slipping and breaking of inferior belting.

Every mill operator, however, knows that there is such a loss figured on a basis of power wasted, idle machinery, etc., and does what he can to eliminate it.

By actual experience it has been proved that the Republic Belts designed and made specially for paper mill work, reduce this hidden cost to a minimum.

Any paper manufacturer who has ever used Republic Invader or Double Cross Belting will substantiate this claim.

Let Us Serve You

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Youngstown, Ohio

REPUBLIC BELTING

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Drying Machine Corp. of Am., Inc.
Sturtevant Co., B. F.

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Sturtevant Co., B. F.

DUST COLLECTING SYSTEMS
American Blower Co.
Bayley Mfg. Co.
Sturtevant Co., B. F.

DYESTUFFS
A. Klipstein and Co.
H. A. Metz & Co.
National Aniline & Chemical Co.
Sandoz Chemical Works.
The White Tar Aniline Corp.

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General Electric Co.
Westinghouse Electric & Mfg. Co.

ELEVATORS
The Brown Hoisting Mach. Co.
The Jeffrey Mfg. Co.
Robert L. Latimer & Co.
Link Belt Co.
The Union Chain & Mfg. Co.

ELEVATORS (Portable)
The Jeffrey Mfg. Co.
New Jersey Foundry & Machine Co.

EMBOSSING MACHINES
John Waldron Corp.

ENAMELS
Stewart-Adams & Co.

ENGINES
American Blower Co.

ENGINES (Pumping)
Nordberg Mfg. Co.

ENGINES (Repairs)
Nordberg Mfg. Co.

ENGINES (Steam)
Ingersoll-Rand Co.
Sturtevant Co., B. F.
Nordberg Mfg. Co.

ENGINEERS
James L. Carey,
George F. Hardy.
Hardy S. Ferguson.
Ferguson Engineers.
Management Eng. & Dev. Co.
V. D. Simons.
Stebbins Engineering & Mfg. Co.
H. S. Taylor.
Jos. H. Wallace & Co.

ENGINEERS (Chemical Pulp Mill)
Stebbins Engineering & Mfg. Co.

ENGINEERS (Structural)
The Austin Co.

EVAPORATORS
Swenson Evaporator Co.
The Zaremba Co.

EVAPORATORS (Disc)
Manitowoc Eng. Works.

EXHAUSTERS
American Blower Co.
The Jeffrey Mfg. Co.
J. O. Ross Eng. Corp.
Sturtevant Co., B. F.

FANS
American Blower Co.
Bayley Mfg. Co.
The Jeffrey Mfg. Co.
J. O. Ross Eng. Corp.
Sturtevant Co., B. F.

FELTS
Draper Bros. Co.

FELTS AND JACKETS
Appleton Woolen Co.
Fitchburg Duck Mills.
F. C. Huyck & Sons.
Lockport Felt Co.
Shuler and Benningshofen.
Waterbury Felt Co.

FELT AND WIRE GUIDES
Moore & White Co.

FILTER (Continuous Suction)
Oliver Continuous Filter Co.

FILTERS (Pressure and Gravity)
Hungerford & Terry, Inc.
Norwood Eng. Co.
Paiges & Jones Chemical Co.
The Permutit Co.

FLOOR PLATES (Safety)
Joseph T. Ryerson & Son, Inc.

FLOUR SACK MACHINERY
Smith & Winchester Mfg. Co.

FOURDRINIER MACHINES
Beloit Iron Works.
Smith & Winchester Mfg. Co.

FOURDRINIER WIRES
Appleton Wire Works.
Cabble Excelsior Wire Mfg. Co., The Wm.
Capital Wire Cloth & Mfg. Co., Ltd.
Cheney Bigelow Wire Works.
Eastwood Wire Mfg. Co.
Lindsay Wire Weaving Co.
The W. S. Tyler Co.

FRICTION CLUTCHES
The Falls Clutch & M. Co.
Moore and White Co.
The Webster Mfg. Co.
Weller Mfg. Co.
T. B. Wood's Sons Co.

GEARS
Cleveland Worm Gear Co.
The Falls Clutch & M. Co.
Foote Bros. Gear & Machine Co.
Wm. Ganschow Co.
Hill Clutch Co.
The Jeffrey Mfg. Co.
Meisel Press Mfg. Co.
Poole Engineering & Machine Co.
Robins Conveying Belt Co.
The Webster Mfg. Co.
Weller Mfg. Co.

GEARS (Bakelite)
Foote Bros. Gear & Mach. Co.
Meisel Press Mfg. Co.

GEARS (Herringbone)
Fawcus Machine Co.

GEARS (Rawhide)
Foote Bros. Gear & Mach. Co.
Meisel Press Mfg. Co.

GEARS (Silent Chain)
Meisel Press Mfg. Co.
Morse Chain Co.

GEARS (Worm)
Beloit Iron Works.
Cleveland Worm & Gear Co.
Fawcus Machine Co.
Foote Bros. Gear & Mach. Co.
Meisel Press Mfg. Co.
Poole Eng. & Mach. Co.

GENERATING SETS
Sturtevant Co., B. F.

GENERATORS (Turbo)
Sturtevant Co., B. F.

GLUES
B. F. Russ Co.

GOVERNORS (Pump)
Foster Eng. Co.

GRAB BUCKETS
The Brown Hoisting Mach. Co.
Industrial Works.
Orton & Steinbrenner Co.

GRANITE ROLLS
Beloit Iron Works.
Jones Bros. Co.

GREASE
Waverly Oil Works Co.

GREASE CUPS
The Falls Clutch & M. Co.
The Lunkenheimer Co.

GRINDERS
Glens Falls Machine Works.
Union Iron Works.
Valley Iron Works.

GRINDERS (Magazine)
Chas. Walmsley & Co.

GRINDSTONES
The Smallwood-Low Co.

HAMMERS (Double Acting Steam Pile)
Industrial Works.

HANGERS
The Falls Clutch & M. Co.
Hill Clutch Co.
Louden Mach. Co.
Standard Pressed Steel Co.
The Webster Steel Co.
The Webster Mfg. Co.
Weller Mfg. Co.
T. B. Wood's Sons Co.

HEATERS (Open Steam)
Biggs Boiler Works.

HEATING SYSTEMS
American Blower Co.
J. O. Ross Engineering Corp.
Sturtevant Co., B. F.

HOISTS (Chain)
Louden Mach. Co.
Joseph T. Ryerson & Son, Inc.

HOISTS (Electric)
Link-Belt Co.
Northern Eng. Works.

HOISTS (Portable, Air & Steam)
Ingersoll-Rand Co.

HOISTING AND CONVEYING SYSTEMS
The Brown Hoisting Mach. Co.
The Jeffrey Mfg. Co.
Link-Belt Co.
Louden Mach. Co.
Northern Engineering Co.

HOSE (Acid, Air, Steam, Suction, Water)
Voorhees Rubber Co.

HOISTING AND MONORAIL SYSTEMS
The Brown Hoisting Machine Co.
Louden Mach. Co.
Northern Eng. Works.

HYDRAULIC MACHINERY
Hydraulic Machine Co.
Southwark Fdy. & Mach. Co.

INCINERATORS
The Biggs Boiler Works.
Manitowoc Eng. Works.

INSECTICIDES
Stewart-Adams & Co.

IRON CASTINGS
Beloit Iron Works.
Hill Clutch Co.
Valley Iron Works Co.

IRON & STEEL SUPPLIES
Brown-Wales Co.
Joseph T. Ryerson & Son, Inc.

JORDAN ENGINES
The Appleton Machine Co.
Jones & Sons Co., E. D.
Noble & Wood Machine Co.
Old Hickory Powder Plant.
Smith & Winchester Mfg. Co.
Shartle Bros. Machine Co.

JORDAN FILLINGS
Noble & Wood Machine Co.
The Shartle Bros. Mach. Co.

KETTLES (Steam Jacketed)
The Biggs Boiler Works Co.
Manftowoc Eng. Works.

KNIVES
Simonds Saw and Steel Co.

KNIFE GRINDERS
Bridgeport Safety Emery Wheel Co.
Machinery Company of America.

KRAFT AND SULPHATE PULPS
The Borregaard Co., Inc.

LAYBOYS
Moore and White Co.

LININGS (Acid Proof)
Stebbins Engineering & Mfg. Co.

LININGS (Digester)
Stebbins Engineering & Mfg. Co.

LOFT PAPER DRYERS
John Waldron Corp.

LUBRICATING GREASE
The Keystone Lubricating Co.
Robins Conveying Belt Co.

MACHINE DRYER TEMP. CONTROL
Stickle Steam Specialties Co.

MACHINE SHOP EQUIPMENT
Joseph T. Ryerson & Son, Inc.

MECHANICAL DRAFT APPARATUS
American Blower Co.
Bayley Mfg. Co.
Sturtevant Co., B. F.
The Jeffrey Mfg. Co.

MECHANICAL PULP
J. Anderson & Co.
The Borregaard Co.

MECHANICAL RUBBER GOODS
Voorhees Rubber Co.

METERS (Gasoline)
Bowser & Co., Inc., S. F.

METERS (Stock)
Trimbey Machine Works.

MILL WHITE
Detroit Graphite Company.
Stewart-Adams & Co.
Vortex Manufacturing Co.

MIXING SYSTEMS
Trimbey Machine Works.

OILS
Waverly Oil Works Co.

OIL BURNING EQUIPMENT
Combustion Engineering Corp.
The Engineering Co.

OIL FILTRATION & CIRCULATING SYSTEMS
Bowser & Co., Inc., S. F.

OIL HANDLING & STORING EQUIPMENT
Bowser & Co., Inc., S. F.

OIL STORAGE SYSTEMS
Biggs Boiler Works Co.

OVERHEAD CARRYING SYSTEMS
Louden Mach. Co.

PAINT (Metal Preservative)
Stewart-Adams & Co.
Wailes Dove-Hermiston Corp.

PAINTS
Detroit Graphite Co.
Stewart-Adams & Co.
Vortex Manufacturing Co.

PAPER BAG MACHINERY
Smith & Winchester Mfg. Co.

PAPER CUTTERS & SLITTERS
Beloit Iron Works.
Hamblet Machine Co.
Meisel Press Mfg. Co.
Smith & Winchester Mfg. Co.

PAPER CALENDER ROLLS
John Waldron Corp.

PAPER CORES
Sonoco Products Co.

PAPER DISTRIBUTERS
Perkins-Goodwin Co.

PAPER EXPORTERS & IMPORTERS
E. J. Keller Company.
Lagerloef Trading Co.

PAPER MACHINES
Bagley & Sewall Co.
Beloit Iron Works.
The Black-Clawson Co.
Smith & Winchester Mfg. Co.
Valley Iron Works.

PAPER MACHINE DRIVES
Beloit Iron Works.
Harland Eng. Co.
Nordberg Mfg. Co.
Westinghouse Elec. & Mach. Co.

PAPER MANUFACTURERS
Eastern Manufacturing Co.
Hammermill Paper Co.
Munising Paper Co.
Union Bag & Paper Co.
Watervliet Paper Co.
Wausau Sulphate Fibre Co.

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J. Anderson & Co.
The Borregaard Co., Inc.
Diamond Alkali Co.
Gatti Paper Stock Corp.
Daniel M. Hicks, Inc.
E. J. Keller Company.
A. Klipstein & Co.
The Mathieson Alkali Wks.
Mendelson Bros. Paper Stock Co.
Pennsylvania Salt Mfg. Co.
Perkins-Goodwin Co.

PAPER STOCK CUTTERS
Taylor, Stiles & Co.

PARCHMENT MANUFACTURERS
Kalamazoo Vegetable Parchment Co.

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Hendrick Mfg. Co.
Riter-Conley Co.
Manitowoc Eng. Works.

PERFORATED METALS
Hendrick Mfg. Co.
Charles Mundt & Sons.

PERFORATORS
Meisel Press Mfg. Co.

PILLOW BLOCKS
Hill Clutch Co.
T. W. Wood's Sons Co.

PILE DRIVERS
Industrial Works.

PINIONS
Foote Bros. Gear & Mach. Co.

PIPE RIVETED STEEL
American Spiral Pipe Works.
The Biggs Boiler Works.
Hendrick Mfg. Co.

PIPING EQUIPMENT
Commonwealth Pipe & Supply Co.
Pittsburgh Piping & Equip. Co.
Tate, Fisher & Rice Co.

PIPING SYSTEMS INSTALLED
Pittsburgh Piping & Equip. Co.

PIPING (Wrought Iron)
Joseph T. Ryerson & Son, Inc.

PIPE THREADING & CUTTING MACHINERY
Toledo Pipe Threading Machine Co.

PLATES (Steel)
Joseph T. Ryerson & Son, Inc.

PNEUMATIC CHIP HANDLING SYSTEMS
Bayley Mfg. Co.

PNEUMATIC TOOLS
Ingersoll-Rand Co.
Joseph T. Ryerson & Son, Inc.

POWDERED COAL EQUIPMENT
Weller Mfg. Co.

POWER TRANSMISSION
The Carlyle Johnson Machine Co.
W. E. Caldwell Co., Inc.
The Falls Clutch & M. Co.
Hill Clutch Co.
Robert L. Latimer & Co.
Link-Belt Co.
The Union Chain & Mfg. Co.
Valley Iron Works.
The Webster Mfg. Co.
Weller Mfg. Co.
T. B. Wood's Sons Co.

PRINTING PRESSES
Meisel Press Mfg. Co.

PRINTING MACHINES
John Waldron Corp.

PULLEYS
W. E. Caldwell Co., Inc.
The Falls Clutch & M. Co.
Hill Clutch Co.
Robert L. Latimer & Co.
J. B. Wood's Sons Co.

PULP (Chemical)
J. Anderson & Co.
The Borregaard Co., Inc.
E. J. Keller Company.
Lagerloef Trading Co.
Perkins-Goodwin Co.
Price & Pierce, Ltd.
The Pulp & Paper Trading Co.

COMBUSTION ENGINEERING CORPORATION
LIMITED
POWER PLANT EQUIPMENT

STOKERS OF ALL TYPES
PULVERIZED FUEL SYSTEMS
STEAM TURBO-GENERATORS
HIGH SPEED STEAM ENGINES
WATER TUBE BOILERS

AIR PREHEATERS
RADIAL BRICK CHIMNEYS
COAL HANDLING EQUIPMENT
ASH CONVEYORS AND HOPPERS
STEAM PIPING

SUSPENDED FLAT ARCHES
DE-AERATORS
CONDENSERS OF ALL TYPES
OIL BURNING EQUIPMENT
BOILER FEED PUMPS

PULVERIZING AND GRINDING MILLS
RECORDING INSTRUMENTS
INDUCED AND FORCED DRAFT FANS
DIESEL OIL ENGINES
ECONOMIZERS

HEAD OFFICE—TORONTO
VANCOUVER, MONTREAL, WINNIPEG

PUMP SPECIALISTS

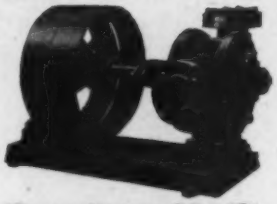


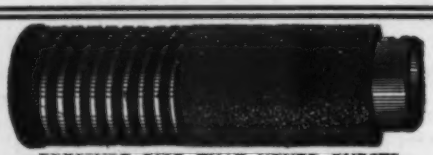
Fig. 301 illustrates Taber "R" type Rotary Pump

QUALITY design, materials, and workmanship enter into every Taber Pump. We build to suit your specific needs. Submit your pumping problem thru our "Silent Sales Engineer."

Write for "him" if he isn't calling on you.

TABER PUMP CO., Buffalo, N. Y.
Builders of Centrifugal and Rotary Pumps

PUMPS
INDUSTRIAL—AGRICULTURAL—MUNICIPAL—RESIDENTIAL
A Type for Every Service
THE GOULDS MANUFACTURING COMPANY
SENECA FALLS, N. Y.
GOULDS



PRESSURE PIPE THAT NEVER BURSTS
Built in sizes 1 inch to 48 inches

WYCKOFF WOOD PIPE
The Paper Industry is successfully using thousands of feet of this Pipe and they find it to be the best conveyance for Paper Stock and Acids that can be obtained.
Write today for catalog and prices
A. WYCKOFF & SON COMPANY
1855 Elmira, N. Y., U. S. A. 1924

A. D. COOK, Inc.
Lawrenceburg Indiana

FIG. NO. 89

Manufacturers of Deep Well Pumps, Working Barrels, Rods, Foot Valves, Strainers and a full line of Water Well Supplies.

The accompanying half tone shows the COOK Patent Brass Tube Well Strainer with Standard Fittings, which are Bail Plug in the bottom and Foot of Blank and Lead Packer on top.

When the COOK Strainer is properly selected for the water bearing sand, capacity and method of pumping, it will successfully deliver the maximum yield of the well for many years free from sand and the troubles incident thereto.

Write for Bulletin 30A

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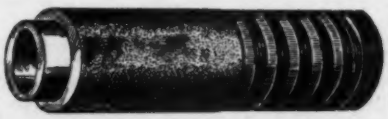

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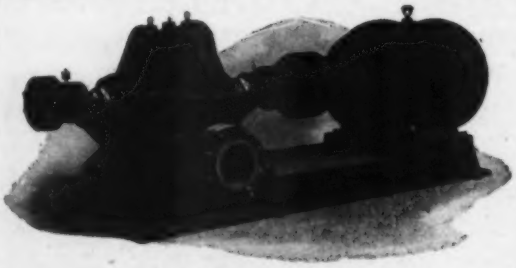

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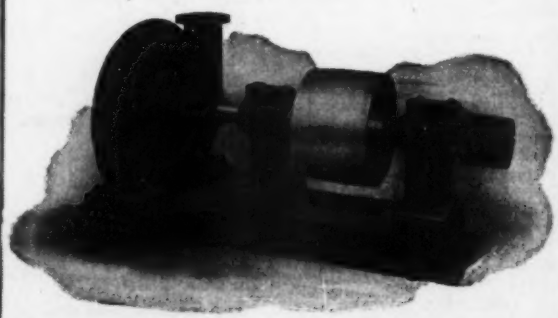

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